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BRIEFLY TOLD.

MUCH ADO ABOUT VERY LITTLE.—Some of the daily newspapers of New York, in their issues for Sunday, the 21st inst., and Monday, the 22d inst., contained much sensational matter respecting the evil effects which followed the distribution of gas in Mount Vernon, N. Y., on the night of Friday, November 19th. The stories were of a nature calculated to cause the reader to believe that scores of residents of Mount Vernon had been incapacitated, or physically reduced to the point of total collapse, through having inhaled "sulphurous fumes" given off by the gas as it was being burned in the residences of the aforesaid "scores." Highly drawn pictures of the victims in the act of collapsing were profusely given; in fact, one could not help believing, if he trusted entirely to the text and the pictures in forming an opinion in the premises, that many households in the handsome little city of Mount Vernon were in mourning because of the suffocation of one or more of their inmates. The newspaper stories were, of course, incoherent and flighty, but still there was enough of fact in them—and they were so widely disseminated—that since Monday last we have received several inquiries from gas men at different points for information regarding the happening. So that all may be answered at once, we take this method of replying. It is true that some imperfectly purified gas was passed on to the consumers' burners on the night of Friday, November 19th, and that some inconvenience and discomfort were occasioned thereby to some of the customers of the East Chester Gas Light Company, of Mount Vernon, N.Y.—the named works are operated by the American Gas Company, of Philadelphia, the resident Superintendent being Mr. Charles L. Gerould, whose training and practice eminently qualify him for that position. Investigation proves that no one in Mount Vernon was more than temporarily upset by the untoward happening; and that no serious results of any kind whatever can be charged to the faulty service. The impure gas was on only a short time, since at the very first intimation of trouble the defect was located and the remedy applied. The official statement made by Superintendent Gerould contains this paragraph, which will plainly reveal how the impure gas got by the works: "* * * Friday morning, at the test, the gas was found to be getting dirty in the middle purifier, and, as the custom is, a new or clean purifier was turned on and the dirty one shut off, and made ready to be revivified or cleaned, to take its place when needed. We have found that the oxide in this clean purifier was on fire, and, being in a closed vessel, only smouldered. It being the last box that the gas went into, the fumes of the smouldering oxide went into the gas and caused the trouble. * * *." In support of our statement that whatever suffering or inconvenience was experienced was slight, we reprint some lines of the report of the happening as described in the edition of the Mount Vernon *Daily Argus*, for Monday last. These lines are given in the full belief that those in the newspaper business in Mount Vernon are quite as competent to know what is going on there as are those whose permanent business location is many miles away. The *Argus* said: "* * * There were cases where people with weak lungs were made uncomfortable by inhaling sulphurous odors, but nothing serious has been reported. * * * It is also to be noted that not every house was affected. In some localities the gas had no perceptible effect on the people using it, and hundreds of citizens knew nothing of the trouble until they read about it in the newspapers." It is admitted that impure gas was distributed, but the evil effects therefrom were so greatly exaggerated that it is fair to presume some ulterior motive was underneath the stories promulgated. The Company does not propose to allow the matter to be closed until a thorough investigation of it in every sense and aspect has been made; and the outcome of such investigation will in due time be given in the JOURNAL.

"A PRACTICAL TREATISE ON MINERAL OILS AND THEIR BY-PRODUCTS."—We have received a copy of a "Practical Treatise on Mineral Oils and Their By-Products," by Mr. I. I. Redwood, whose name is prominent on the rolls of the American Society of Mechinal Engineers and of the Society of Chemical Industry, England. Mr. Redwood has figured in authorship lists before, principally through his well-compiled volume on "Theoretical and Practical Ammonia Refrigeration," and with much purpose, for the latter volume has been widely read. In his present compilation he gives, in addition to its set object, a "short history of the Scotch shale oil industry, the geological and geographical distribution of Scotch shales, recovery of acid and soda used in oil re-

fining; and a list of patents relating to apparatus and processes for obtaining and refining mineral oils." While it is true that the matter compiled relates mainly to the Scottish shale oil industry, it is also true that those interested in the oil industry at large will find in the "Treatise" enough of value to warrant them studying its pages. The publishers (Messrs. E. & F. N. Spon, London, and Spon & Chamberlain, New York) have left nothing undone that they should have done in getting up a well printed and well bound book, and the illustrations (which are many and artistic) greatly add to a quick and complete comprehension of the text.

NOTES.—We regret to have to report the death of Mrs. Sarah J. Starr, wife of Mr. James M. Starr, once so prominent in the gas business through his former ownership and management of the Richmond (Ind.) gas works. Mrs. Starr, who was born in Richmond, Ind., December 24th, 1853, was noted for her charities.——The Dorchester (Mass.) Gas Light Company has applied to the Board of Gas and Electric Light Commissioners for the right to increase its capital stock in the sum of $200,000. The first hearing on the application will be had to-morrow. ——The Clyde (N. Y.) Electric Light and Power Company has purchased the plant and franchises of the Clyde Gas Company. Formal possession will be taken December 1st.——The Buffalo City (N.Y.) Gas Company, formed for the purpose of completing the change in ownership of the separate Buffalo Gas Companies, was incorporated last Tuesday. It is capitalized in $7,000,000, and the named Directors are: C. D. Lithgow, E. D. Phillips, E. J. Graetz, F. W. Schramm, Jno. M. Snyder and Emerson McMillin, of New York; G. T. Thompson, Jersey City, N. J.; and C. T. Scoville and P. Vaughan, Brooklyn, N. Y.

German Insurance Regulations Over the Use of Acetylene.

The London *Journal* thus sums up the essential points in the rules and regulations issued by the Imperial Insurance Office of Germany for the guidance of those engaged in the manufacture, compression and liquefaction of acetylene:

Rules for Employers and Foremen.—Liquefaction of acetylene must be carried out apart from the manufacture and compression; but if the gas is compressed to eight or more atm spheres, the compression also must take place in a separate apartment. The apartments must be well lighted and ventilated; have doors opening outwards; and be heated only by steam or hot water. External sources of light only may be used; or, in urgent cases, safety lamps may be resorted to. The carbide must be kept in moisture proof vessels, which vessels must be stored in well ventilated dry apartments (not cellars). The vessels should be opened only as needed for immediate use. As little dust as possible should be made in breaking up the carbide; and persons engaged in the work should be free from heart or lung diseases, and should wear a respirator and eye protectors. The gasholder must be situated in the open, or in a well ventilated apartment away from the generating room; and it must be provided with a pressure gauge. An efficient washer must be placed between the generator and the holder. The gas must be generated by the gradual addition of carbide to a large excess of water; and not by adding water to carbide. Compression of acetylene to more than 10 atmospheres pressure must only be carried out in strongly cooled apparatus. In the liquefaction of acetylene, the condensing vessel must be emptied at the close of operations; and the cylinders used for the conveyance of liquefied acetylene must have been tested to 250 atmospheres pressure, and have their contents signified on the outside—in white. Before and after filling, the cylinders must be weighed with precision; and no more than 1 kilo. of acetylene per 3 liters capacity (20.8 pounds per cubic foot) be admitted. The charged cylinders must not be exposed to heat. The cylinders and all apparatus which comes in contact with liquefied acetylene must be entirely free from copper, and sharp angles in valves and apparatus avoided.

Rules for Workmen.—Naked lights and lucifer matches must not be used in the apartments of acetylene works; and safety lamps must not be opened. In breaking lumps of carbide, as little dust as possible should be made. Water must never be added to carbide; and only small pieces of carbide added to water. The prescribed temperatures must be closely observed in the compression and liquefaction of the gas. The cylinders used for liquefied acetylene must answer to, and be filled in accordance with, the prescribed conditions. On opening a cylinder, take care the acetylene issues very gradually.

A copy of the rules must be hung in a suitable place in the apartments. Fines are imposed for breaches of regulations.

[Prepared for the JOURNAL.]

The Illumination of Inclosed Space.—No. I.—The Problem.

By DR. W. H. BIRCHMORE.

The problem presented to the individual man intending to provide light for any inclosed portion of space, by which, for the purpose of this discussion, is understood a hollow figure bounded by surfaces, is more or less exactly a copy of the problem presented to any one intending to illuminate any other space of the same or similar sort; and, as such, is to some degree capable of a mathemical discussion. Strictly speaking, however, the mathematical discussion has, up to this present, been principally concerned with a space either quite unlimited, or of such large dimensions—large, that is, in proportion to the light units employed in the illumination—that the laws governing light projection have seemed to apply. Within this limit experience has provided data, which, properly discussed by many competent hands and pens, have reduced this part of the problem to a by-corner in mathematical physics.

Outside of the domains thus pre-empted by the experts in physics is a wide range of debatable ground, over which mathematical formulæ and fetters have not yet been set up as landmarks. Concerning this domain we have much information derived from experiments, and experience of a sort not properly to be called by this name, and a multitude of minute details are matters of record. Some attempts at mathematical generalizations have been made, but the results have not justified the labor expended. Beyond this debatable ground stretches out a far vaster region quite unexplored, which is occasionally invaded by an adventurer, so-to say, who sometimes brings away rich booty, but who more often leaves his stores a prey to the savage difficulty of the way.

In every problem in illumination, no matter how explicit, or how vast and indeterminate, a point and a plane are always found given. This point is the center of the luminous radiation, the plane is that of projection. In illuminating all out-of-doors, as with a street lamp, the given plane is the street level, and the luminous point the virtual center of the (*e. g.*) Welsbach mantle heated to incandescence by a flame. Persons walking or riding by such a lamp intersect the lines of radiation, as opaque bodies must, and cast shadows on the projection plane. These shadows are intensely dark, by contrast, and are often the cause of loud complaints, sometimes only too well justified. In general, however, streets are held to be well lighted, and the out-of doors illumination problem may be considered as solved.

In inclosed space, for example, a large room, using the words in the most restricted sense, so satisfactory a conclusion would not hold good; in the practical illumination of a room 50 feet long, 20 feet wide, and 12½ feet high, for instance. This room would have 1,000 square feet of floor space, and in this respect answers nearly enough to the floor space of the parlors in an average house in this city. The total area of the boundary planes, omitting the accounting of doors and windows, is as follows: Floor, 50 feet × 20 feet = 1,000 square feet; ceiling, 50 feet × 20 feet = 1,000 square feet; ends, 2 × 12½ feet × 20 feet = 500 square feet; side, 2 × 50 feet × 12½ feet = 1,250 square feet; total area of limiting surfaces = 3,750 square feet; total cubic contents, 50 feet × 20 feet × 12½ feet = 12,500 cubic feet.

Within this space are objects which must be rendered visible and distinct. The principal purpose of the use of artificial light is really to make such discrimination easy. These objects differ in their shape, density, opacity, color; some have large indices of reflection, others hardly reflect light at all. In studying the problem of illuminating this space, all these things, and their influence on the final solution, must be considered. The first question, however, naturally concerns the centers of radiation, the various points which are the loci of the forces producing the disturbance we call light.

Location of the Lamps.—"Shall the lamps be in the center, or on the sides to secure the best results?" This question, if it may be so called, is one which must come to every one who has to determine the data for illuminating a room, and in the majority of cases it will be determined as to its answer by a whim of Dame la Mode. Justly treated it is a question of the highest scientific importance, and its satisfactory solution may well employ the minds of men of the most superior attainments.

Historically the location of lights in rooms is a most interesting study, and is one which would justify much antiquarian research; but in this present our study must begin in very recent times, no longer ago than the beginning of this century. For ages two systems of illumination had been in vogue, and at that time were in use. If the room was to be brightly lighted candles, rarely lamps, were used, and these were placed on the sides of the apartment. If the room was very large, in addition to these lamps were used, placed in large frames and hung in chains

from the roof, swinging low so as to get the maximum of service, but sufficiently high to clear the heads of the people assembled in the room. In churches single swinging lamps, and in groups of seven and nine, arranged in various patterns, were quite common. In public halls, notably in Holland, the number of lamps in a group like an inverted pyramid was frequently enormous, and one is mentioned as peculiar in that it contained 365 lamps, one for each day in the year. There should be no confusion between these "chandeliers" and those we have knowledge of for gas lights; they have nothing in common, except that both are pendant systems. The construction was entirely different. Sometimes the swinging frame was filled with candles instead of lamps, but as the heat in the upper tiers was enormous the candles softened and such lights were difficult to maintain and were seldom used. The danger that the lamps in these large groups would be over-heated, especially in the uppermost tiers, was well understood, and this method of illumination was by no means approved of, although very generally used. In Paris it was placed under the ban after the accident which history records as having so notably disturbed Napoleon's equanimity.

Fashion, prejudice and prudence, alike favored the wall lights, until gas furnished a perfectly safe method of illuminating a room from the dome or ceiling.

This method was at first introduced and adopted only in rooms of great height. The pendants bearing the gas burners was needfully a few feet long to give them room, and, in the comparatively low rooms of the early part of this century, such pendency would have caused serious inconvenience in the average habitation. How far the demand for pendant lights in the middle of a room has influenced the increase in height no one can say; undoubtedly it has influenced the change to an extent, in the opinions of some experts, very materially. An evidence almost amounting to demonstration of the reason for the preference shown for the use of the pendant lamp rather than the bracket may still be seen in many "improved properties," in which the rooms are so low that some article of furniture is set beneath the pendant lamp to prevent the injurious contact of some unaccustomed head.

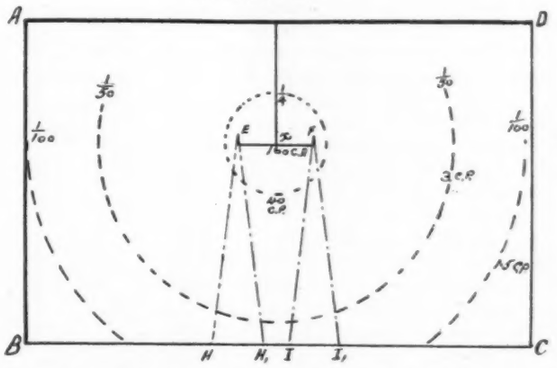
Historically, the habit, or fashion, of lighting rooms from the center seems to have the following reason for being. When gas was introduced into the large houses of the rich it was used for display, and, therefore, was used first in the ball rooms. These rooms usually were lofty, and the simplest way of disposing of the piping was to lay it in the floor of the overhead room and then drop the pendant, as is the universal rule to-day. This was the method requiring the minimum of alteration and the minimum of skill. At this period no changes were made in the bedrooms, nor in such rooms as the library or dining rooms. The change was made, first in the ball room, then in the entrance hall; after this in the drawing room. Lamps rather than gas were the fashion in libraries in large houses in London, as late as 1856, and candles have never been displaced in thousands of elegant bed chambers in the West End, if one may judge from the written words.

There is more than sufficient evidence at hand to show that in this city, as in London, the grounds of large houses were illuminated by gas before the drawing rooms. In a luxurious home one would naturally infer that candles and candlesticks would be found on the dining table and in the library and bedrooms long after they had gone from everywhere else. Thus it came about that to have certain rooms illuminated by a pendant gas lamp of many burners was an evidence of wealth, refinement and social superiority. Every builder of brick abominations for the would-be somebodies found it to his advantage to say that "the drawing room in this fine suburban residence is lighted by a pendant of six burners, exactly as is that of Lord X——'s country house nearby." (From a renter's "ad.," 1823, or thereabout.) Necessity, first, and then fashion, set the pace, and rooms are still, if it is a possible thing, lighted with lights hung from the ceiling rather than from brackets on the wall.

Returning to the parlor floor already imagined: From the dimensions given and the arrangement of lights usually employed in this city, it will be a fair assumption that two pendant lamps will be used—one of four burners, 12 feet 6 inches from the rear wall, and one of five burners, 12 feet 6 inches from the front wall. Since the room has been assumed to be 12 feet 6 inches high, these lamps will probably be about 8 feet 6 inches from the floor. The radius will be 18 inches in either case. Assuming the unit to be a Welsbach mantle, and the illumination to be 40 candle power for each mantle, or 160-candle power for the smaller pendant and 200-candle power for the larger one, equivalent to 360 candle power in all, the question which interests us first of all is a purely practical one: "Is this the best use that could be made of this enormous luminosity for the purpose of illumination?"

Description of Diagram A.—Diagram A illustrates the relations of the lights in a plane, passed parallel to the end of the room, through the two lights supposed to be in this plane. *A*, *B*, *C*, *D* are the points of intersection of the four planes bounding the room; *E* and *F* represent

DIAGRAM A.



the two mantles already mentioned; $H H_1$ and $I I_1$ the bases of the triangles representing the shadows cast by the two fixtures in this plane; K and K_1 the centers of luminosity for the two mantles, respectively, of E and F, supposing the two mantles to be equally luminous throughout.

Regarding the two mantles as forming one system the virtual center of luminosity is at x, the center of the circle, which cuts all four mantles at their centers of luminosity, as previously explained, K and K_1.

When one reads by a paraffine, or other "standard" candle, the book or paper read is considered by physiographers to be placed 10 English inches from the eyes, and this is *universally* conceded to be the ordinary position for distinct vision of a type the size of that used for newspaper print. At the same time it should be remembered that the relation of the paper read to the light is not that of a normal plane, but that it makes an angle with this normal consequent upon its distance from the unit light. This distance has, by careful investigation by many observers, been determined to be something very near 18 inches. This being premised as the basis on which this inquiry is to be conducted, the relation of the total incident value of the luminosity actually in use has been reached as follows:

Since the angle formed by the actual normal with the bisecting line between the axis of sight and radiation is so very small as to have no material effect, it has been neglected, and the plane of incidence has been treated as a normal plane. From this it follows that when one possessed of ordinary sight reads this page he will place it 18 inches from a standard candle. Under such circumstances 1 square foot of this page will receive only .6 the light which it would receive at a unit's distance.

The first circle drawn from x as a center applies in this case only to the lights considered as a system. This may be considered as the equator of a sphere containing all four lights having a radius of 2 feet. Every square foot of this sphere is illuminated by as much light as would fall on it from 40 candles at 1 foot distant. The next circle has a radius of 7 feet. On this sphere the square foot accepts as all it can get, $\frac{1}{49}$ of the 160-candle power, while at the next one a radius of 10 feet brings the equivalent down to 1.6 standard candles at the distance of 1 foot. Truly may one complain that the sides of the room are too far from the light.

Another vexatious difficulty is "shadow." Since the entire luminosity in any sphere large enough to contain all four mantles is virtually at X, every line of light casts a shadow more or less intense with respect to this point X. At the same time their exist *four*, no less, other sensible shadows, or five in all, cast more or less exactly in the same direction. The result is a complete disfigurement of the outlines of all complicated surfaces and figures not surfaces of a sphere having its center in X; and as there is not one chance in a million that any such surface will exist one may safely say that no solid of any sort whatever will show its true form anywhere, excepting in the space between the primary shadows of the burners; that is, in the space between H_1—I.

This is a fine state of things truly, and it is useless for any one connected with gas interests to waste his energy in increasing the supply of light until some better arrangement of the centers of luminosity is attempted. The architects who have studied this question anathematize the system, but state that they are powerless against the gas interests, pretending to say that we are the fountain-head from which improvement must come.

While I positively decline to believe we are sinners beyond all the rest

who dwell in Jerusalem, I certainly do think we owe it to our position to try and remedy this state of things. I am by no means ignorant of the beautiful forms given to these pendant lights, nor to the impression of sense produced when one looks upon the 160-candle power assembled around x, nor am I ignorant of the way in which this arrangement spoils effects of dress and ornament by garishness and shadow.

The larger pendant only gives increased prominence to the ills mentioned, but between the two pendants, "in the middle of the room," is a region illuminated most beatifically, almost ideally in fact.

Curiously enough in most city houses this area is made to correspond with a hole in a partition. Careful study has only given me the details of a fact and condition surprised by chance, and in few words this is what I found. Setting up my measuring apparatus in the doorway, usually occupied by the folding doors, I found conditions of illumination and shadow which were strictly comparable with outside (daylight) illumination.

First of all, there were no dense shadows. The greater volume of light from the pendant in the front room cast a shadow on to the field of the lesser pendant; but it was not a dense one, and the secondary shadows had all vanished. The wall which parted the two "parlors," acted as a screen over a large part of the field that was illuminated by the two pendants, thus making worse than ever the exaggerated shadows; but in the doorway the illumination was perfect. Form images which could not be distinguished on either side the doorway, no matter in which room they might be placed, showed distinct and true within the charmed space.

There is nothing plainer and more distinct possible than the reason. Objects are made distinct by the contrast of the two light systems. Obviously, if this theory of the defect were true, there must be an area in which all the shadow effects, and consequent errors produced in opposite order, may be shown at will. Imagine a sheet of tracing paper 1 foot square, to be held so that a normal to its surfaces lies in the plane joining the virtual radiation points of the two pendant systems. Then, since the law of the squares of the distances holds on both sides, the illumination would be exactly equal when the sheet is 13.89 feet from the larger and 11.11 feet from the smaller pendant. We may also imagine a plane perpendicular to the floor to be passed through the two luminosity centers, which will also be normal to the sheet of paper just mentioned. If a third plane be imagined, an enlargement of the paper sheet prolonged to the floor be considered, we shall find that the equality of illumination of the two sides no longer exists, but that there is a small space over which the behavior of the lights is truly mysterious.

Diagram B shows the circles of equal intensity, not of equal radius. It will be seen that while circles of equal intensity in the horizontal plane are tangent, as above stated, there is absolutely no other point where such equality can be established.

This brings us logically to the difference in the shadows. It would be an unwarrantably intricate subject to discuss these shadows in detail, with respect to any great number of planes; but I believe it possible to show their bearing with reference to two planes—that of the axis of the room and of the wall—without dragging in any mathematical difficulties.

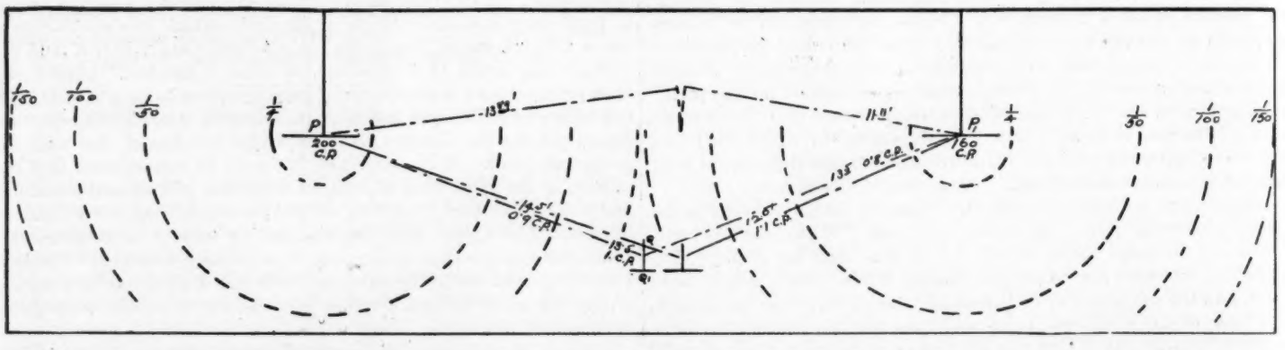
Let $Y Y_1$, in diagram B, be the top of a table covered with a white cloth, and let $Q Q_1$ be a plane of blacked copper, set up on edge normal to the table and to the plane of the two pendant illumination centers, P and P_1. Suppose, first, that this table is placed exactly midway between the lights, as shown in the diagram. Then the angles $Q P Q_1$ and $Q P_1 Q_1$ will be equal, and the amount of light falling on the two sides will vary as the intensity of the radiation—*i. e.*, the light on the side towards P will be to that on P_1 as 5 is to 4. But, if we consider, we must see that one shadow will be more intense than the other, and the lesser shadow will be invisible. If for the plane we substitute a ball, we have sufficient shadow to show the form, and we also have enough illumination on the shadow side to make a *perfect image*. Shade off either light, and the shadow density is increased, the contrast is exaggerated, and the image is rendered imperfect.

Our mental processes supply the wanting parts of the image in some instances; but a photographic camera, in that it has no mind, gives a false impression always. This illumination from one side only, or, as Prof. Airy once called "jug handle illumination," exists perfectly in one-half the room, and more or less in three-fourths.

Now, suppose the plane, table and ball to be placed as near as possible to the wall. The illumination around the entire room is defective as to form images, because of false shadows, or absence of shadow, except between the planes passing through the pendants and parallel to the ends of the room. But the inequality of the illumination between these planes brings the whole form image into relief, and we have a perfect image of the ball, if we can bring the ball into a plane passed horizontally through the pendants; but the image begins to err just as soon as the law of the sines of the perpendicular angles comes into play.

Now, it is obvious that there is no use in pointing out defects in any system except to offer a criticism, and there is less use in a criticism which offers no hope of betterment; therefore, all the time I have spent in studying this question of radiation and shadows is time wasted unless I am prepared to offer a cure. I have not wasted my time in fault finding, for I am prepared to offer a suggestion looking towards such cure.

DIAGRAM B.



If one studies carefully the time of day, the altitude of sun, and the condition of the clouds and atmosphere, when objects are most correctly seen at a reasonable distance from the eyes, say 1,000 feet away, it is demonstrable that vision is clearest and generally most efficient and satisfactory under conditions as follows:

If the sun is directly behind the spectator, vision is best the nearer the sun's altitude is 15°. In any other position whatever it improves, until the sun's altitude reaches 30°, and then falls off rapidly as the sun's altitude exceeds this, unless one happens to be looking directly towards the sun, when the higher the altitude the better the vision. The mathematical expression, although very exact, is unsuited for reproduction here; but generally an object between east and southeast is seen best in the late afternoon; between southeast and southwest, between 9 in the forenoon and 3 in the afternoon; between southwest and west, before 9 in the forenoon; between west, north and east during the two hours either side of noon, and decidedly better in winter than in summer; or, more accurately, between the middle of September and the middle of March than between the middle of March and the middle of September. The condition of the sky which aids most in vision is that of a number of bright white clouds so placed that any line joining them and the sun crosses the line of sight as near as may be at right angles. In general, the less the dust the clearer the vision.

Reducing these well known data to their connection with previous matters discussed, we may institute the following comparisons:

The angle made by the light beam should not be greater than 30° for the major part of the light. In the room we have been discussing this fact forces itself into prominence in a very curious way. If a lady, clad in what is called a "princess dress," stands near to one of the pendants above described, her coiffure and the ornaments of her dress about the neck, the blemishes of skin, the detail of the lace, will dis-

tress one by their intensity, the ornamentation extending towards the hem of the garment becomes less and less distinct, while the detail of the ornament at the hem will be quite invisible—in a word, there is no ensemble; but let the distance be increased so that the angle of 30° or less is made with the lines of radiation by the observer's line of sight, the distressing garishness is gone, and from head to foot the ornamentation appears, the ensemble is complete. This is exactly parallel to the fact just mentioned in regard to the sun. When the lady stood very near the light the angle between the line of radiation and the line of vision was nearly or quite 90°, and the distance between the center of radiation and her head was so small compared to the distance between the center of radiation and the floor that the light fell off rapidly.

The second important fact (that of the white clouds) has already been illustrated by the question of the shadows, but referred to matters of costume, it may be thus illustrated.

Every photographer is taught by bitter experience that, while there must be a certain difference between high light and shadow, this difference must not be too great. I have tried to show how anyone may study its effects for himself in the parlors of an ordinary house. I have stated the relations of the "white cloud" to distant, distinct vision; this is the second important point which must be enforced in a properly illuminated room; both sides of every object in it must be illuminated, persons as well as things.

The third great point in reference to daylight out-of-doors on a clear day is the condition of practical equality of the light. We may sometimes "get out of the sunlight," in order to avoid too intense brilliance and garishness, but we never "get into" it or avoid the shadow. Why is this? Simply because the smooth and even intensity of daylight is nearly the same everywhere. The more nearly we can obtain this in our rooms the better they will be illuminated.

Now, what are the desiderata? First, in place of an angle varying between 90° and 15° in a few vertical feet for that between the line of radiation and sight, an angle varying between 60° and 30° is wanted; second, in place of a difference between illumination and shadow of a possible 160-candle power on one side and a very small fraction of 1-candle on the other, an illumination difference of relatively small amount, a few per cent. being quite enough; third, an even diffusion of illumination over the entire space of the room. Not 200-candle power equivalent in one spot and ½-candle power equivalent in another, but about 25-candle power equivalent everywhere in the room.

There is no need to say this is a thing everyone knows and nobody strives for; this is not true. We who are familiar with such things may know it, but the men who pipe houses, build them, design and live in them do not know it.

If we really set about teaching them we could very soon effect a change of method which would be for our advantage in two ways; first, we would hear less about unsatisfactory illumination; and, second, we would increase the consumption of gas and the revenue of the companies we serve in equal measure. Nor would the consumer complain of an increased expense.

This study was undertaken for an architect in order that a plan might be devised for correcting the faulty illumination of a house. The faulty illumination was corrected, and the client was delighted. I propose in my next chapter to tell how we did it, and to state the result of our experimental test of our success.

The New Conveyer Company's System of Unloading, Distributing and Reloading Materials in Gas Works.[1]

[A paper read before the Midland Association of Gas Managers, by Mr. Meiklejohn, Secretary of the Association.]

In view of our approaching visit to Smethwick, to inspect the works of Messrs. Little & Graham (the New Conveyer Company), it occurred to me that it might not be unwelcome if I made a few notes on the particular work there carried on, and especially in regard to the unloading, distribution and reloading of materials in gas works. The enormous amount of tonnage comprised in the materials delivered to, and sent from, the various gas works in this and other countries, and the handling of those materials in the works, is, I think, sufficient reason for placing this subject in the forefront of interest for those who are responsible for their efficient and economical management.

The introduction of machinery into gas works is, of course, no new thing; and in the largest works, at any rate, we find more or less complete installations of mechanical appliances have been introduced in recent years, with a view to minimizing the most arduous labor in the works, and, while cheapening the cost, to lessen the probability of any serious dislocation in the process of manufacture. These, surely, are three good and substantial reasons for the introduction of machinery into large works. In the first place, the workers are benefited by the transference of the hardest work to the machine; the cheapening of cost promotes the success of the undertaking; and, by safeguarding the continuity of the manufacturing process, the manager sleeps better.

But in small and moderate-sized works, I think I dare venture to say, little advantage has been taken of the appliances now to be had for mechanically dealing with coal, coke, etc., on the works. It is quite apparent that the introduction of machinery into a gas works will be most successful when the work to be done approaches its maximum capabilities, and when it can be kept working at that rate for the longest possible period. When these conditions are reversed, the opposite result must follow. Consequently, for small works, stoking machinery would be an expensive luxury. But when we consider the application of machinery to conveying coal, coke, oxide, etc., in a gas works, the benefit of mechanical appliances would appear to be more nearly proportionate to the size of the works; the power necessary to drive the conveyers, etc., and their capacity being determined by the work required of them.

It would be remiss on my part—although only referring to the subject in general terms, and with illustrations devoid of detail—to omit reminding you of the very complete installation of labor-saving appliances erected by Mr. Hack to his own design at Saltley, and which we had the privilege of inspecting after the annual meeting of the Association in 1895.

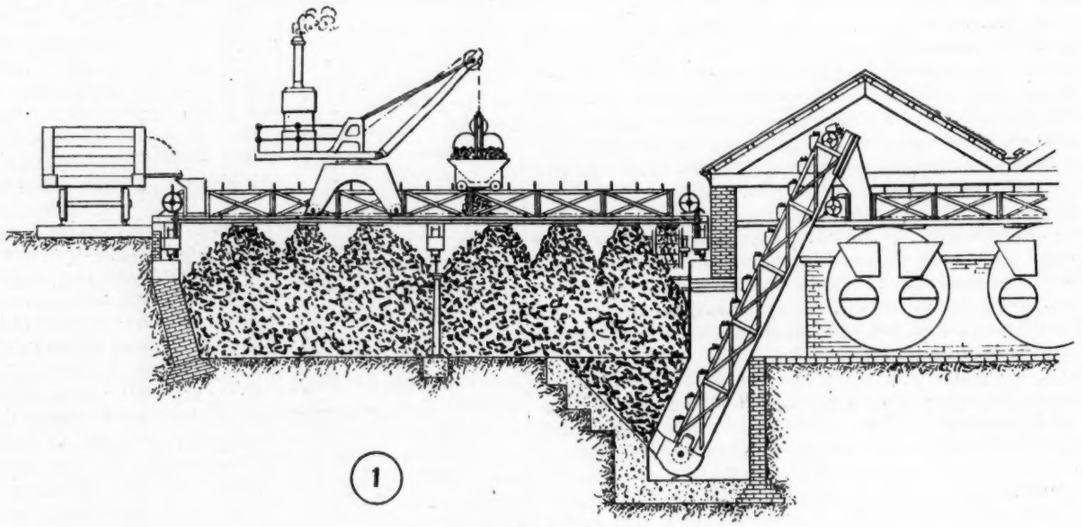
Although one of the effects of the introduction of machinery must, of necessity, be some reduction for the time being in the number of hands employed, it surely cannot be said that, since mechanical science has developed, the volume of labor has declined. Is it not rather that, by cheapening the cost of production, a fillip has been given to industry, the lot of the workman has been ameliorated, and the rapid expansion of business made a possibility? While we may not just yet hope to control the labor of a gas works by the pressure of a button in the office, I think there is an excellent opportunity for many of us to lessen the cost of manufacture, to have more independent control of the men, and to add much to our own peace of mind, by the adoption of every mechanical appliance that can be economically introduced.

The illustrations shown represent some of the latest appliances manufactured by the New Conveyer Company; and I beg heartily to acknowledge my indebtedness to Messrs. Little & Graham, who made it possible for me to place them before you with the explanatory notes that follow.

Diagram No. 1 is an illustration of an automatic coal store, the coal being brought in wagons from the railway siding to the traversing conveyer, which trims and stacks the coal over any part of the yard. The illustration shows an arrangement prepared for a large electric lighting station, with a range of 28 double-flued boilers; but it could be easily modified to deal in a similar way with the coal for a battery of coke ovens or a bench of retorts. It could also be modified and altered so that the traversing conveyer could be fixed at any desirable height above the wagon, and the coal from the wagon lifted to the heightened conveyer by means of an elevator. In the design before you on Diagram No. 1, the discharge of the coal is regulated by means of the outlet doors, and the conveyer is arranged (as you will notice) so that it can be moved along the yard longitudinally, the distance of the travel being limited only by the length of this storage yard. The power necessary to work and control the traversing conveyer is obtained from the small engine of the grab mounted upon the girder of the conveyer, and the grab carriage is arranged to move on rails along the conveyer. The object of this is to keep the coal within range of the grab; but the grab is brought into use only when it is necessary to lift part of the storage coal into the conveyer.

The method of feeding the 28 boilers is to utilize the grab on as few occasions as possible; and to attain this end the coal is carried from the wagons by the conveyer only as each supply comes into the works, and delivers into the end of the yard immediately over the boot of the elevator. The supply for the boilers, as I have stated, is taken from that part except when the supply runs short, when the grab is brought into use to lift the storage coal from the yard, and deliver it into the conveyer, which in turn shoots it into the part over the elevator boot, and thence, by means of the elevator, to the conveyer, which distributes it into each of the 56 hoppers of the mechanical stokers on the 28 boilers. At the foot of the elevator boot, a door is fitted to prevent the coal from choking; and this door is operated by a patent

1. From the *Journal of Gas Lighting*.



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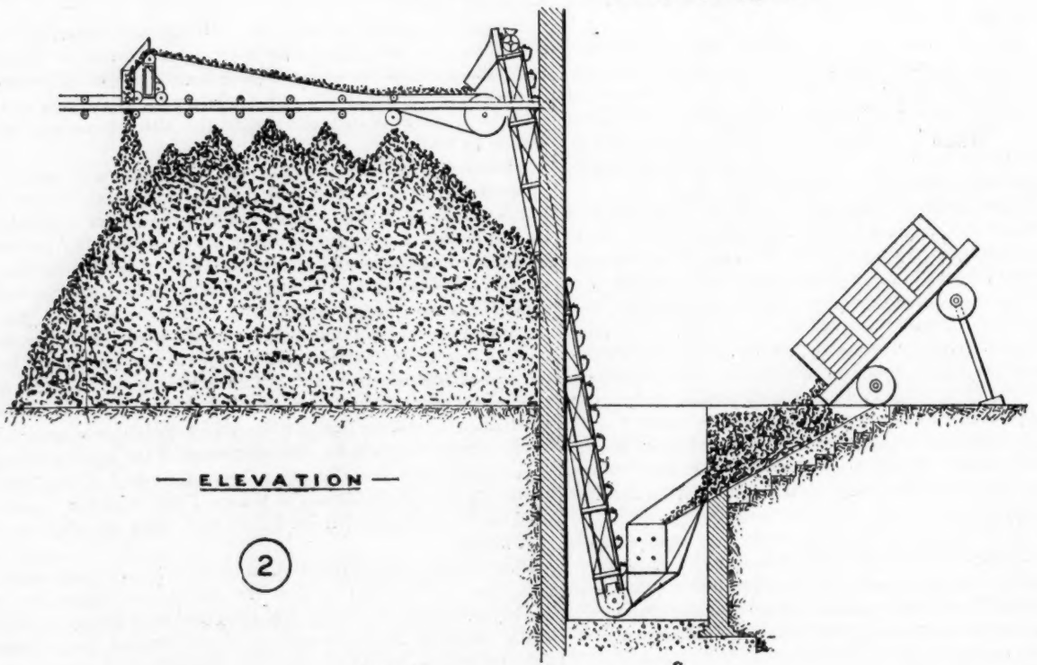

— ELEVATION —

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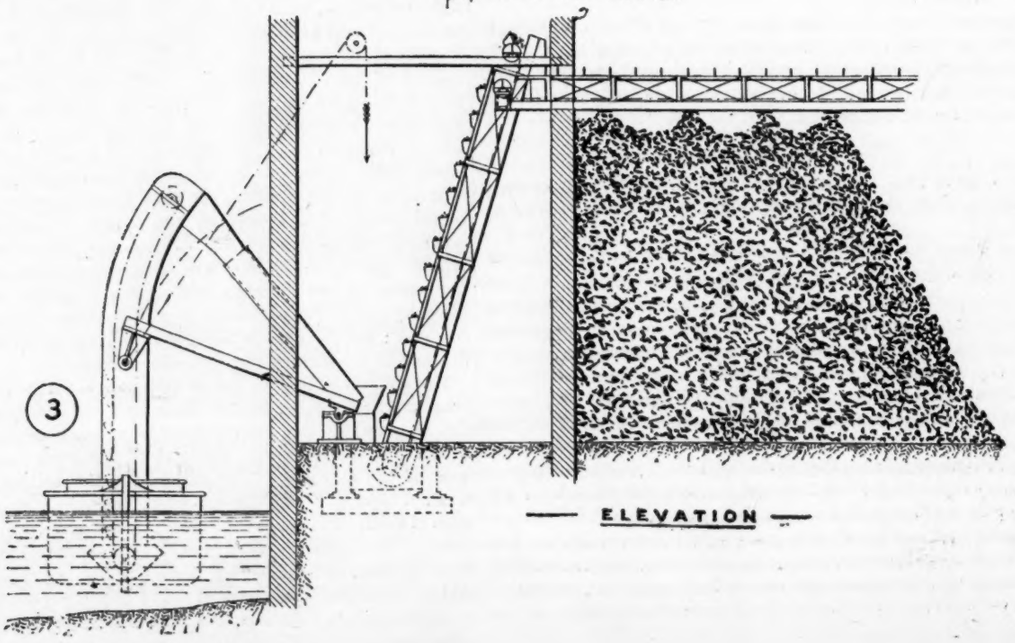

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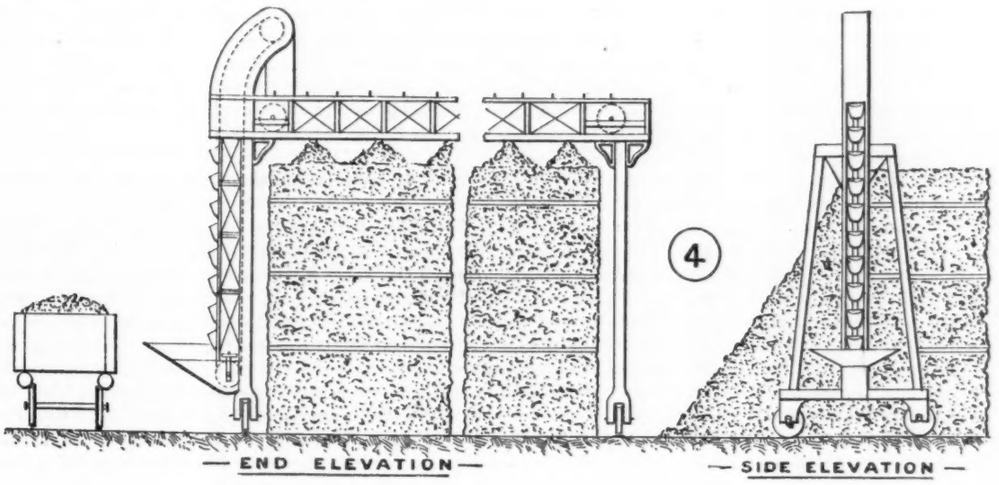

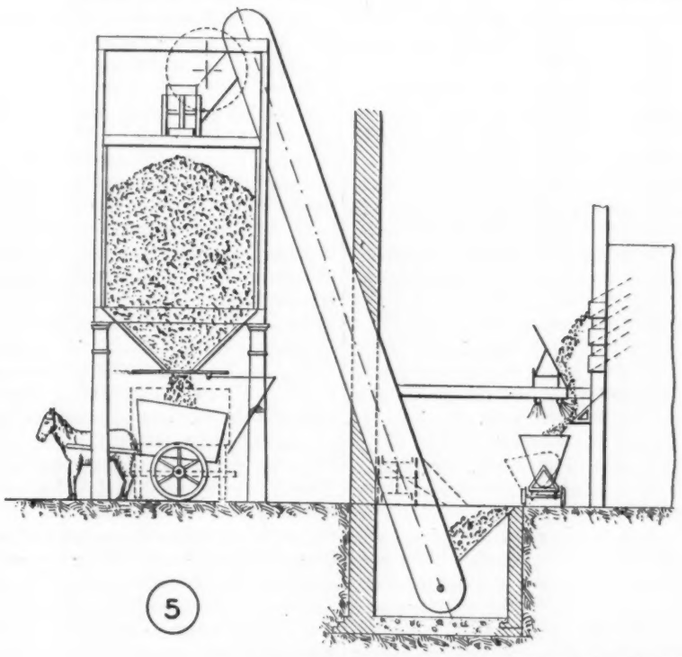

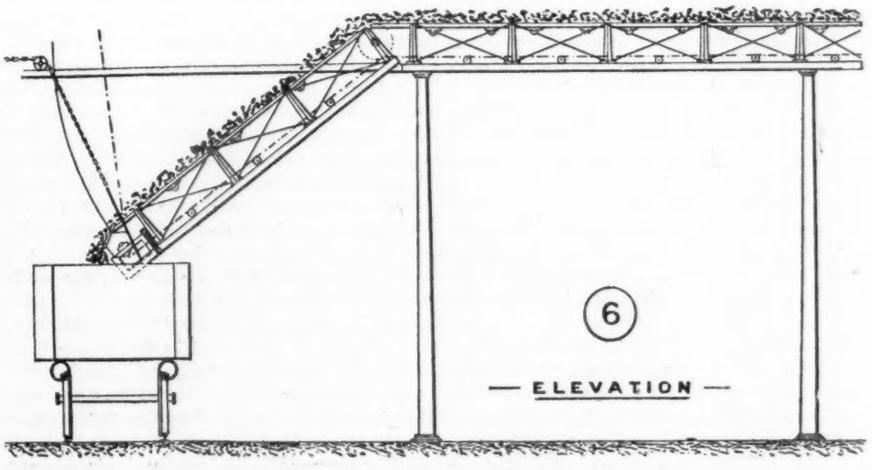

self acting arrangement connected from the driving shaft of the elevator, so that the quantity of coal allowed to pass into the boot is controlled by the speed of the buckets. The correct quantity only is admitted, so that all risk of a stoppage is obviated. If an arrangement like this were made to deal with the coal for a bench of gas retorts, the coal would be lifted in a similar manner to the storage tanks or stores along the range of retorts, and trimmed to each in a similar way to that adopted in the drawing before you to supply the range of 28 steam boilers. The arrangement on Diagram No. 1 would be very suitable for the coal yard of a large gas works with an installation of sloping retorts.

Diagram No. 2 shows a general arrangement for unloading coal by tipping the truck up at the end to shoot the coal, as shown, into the receiving hopper over the coal breakers. Many different arrangements

on lines similar to that shown in Diagram No. 2 are already at work, particularly in connection with batteries of coke ovens and coal washeries. The wagon is brought to the point where it is to be emptied, and the raising of the wagon is generally effected by means of a small hydraulic ram. As the contents of the wagon are tipped into the hopper over the breaker, it gradually slides into the coal breaker; but in front of the breaker it is preferable to arrange a small screen through which the smaller coal falls direct to the elevator boot, and the large pieces pass into the rolls of the breaker—adjoining the small screened coal at the point just above the elevator boot. The elevator lifts the coal, and delivers it on to a band conveyer, which can be made any desirable length to trim coal over a store from 20 feet to 1,000 feet in length. The band conveyer, is found, from experience, to be preferable if made of a combination of canvas. The coal is delivered from the band conveyer by means of a throw-off carriage, as shown, which can be moved, as desired, from point to point, to trim the coal at any part of the yard. The conveyer band may be made any width, to deal with quantities of from 20 to 600 tons per hour.

Diagram No. 3 shows an arrangement of elevators and conveyers for unloading coal from a barge on the canal or river, and distributing it over a coal store or a coal yard. The elevator which you see is arranged to take the coal from the barge, is made with a close, dust-tight casing to prevent dust blowing about in an elevator fixed in this open manner. The barge elevator is raised or lowered as may be necessary to suit the rise and fall of the water or tide, by means of compensating balance weights. The elevator working in the barge lifts and delivers the coal into the telescopic shoot, which in turn feeds the small hopper over the boot of the stationary elevator; and this stationary elevator lifts the coal and delivers it into the conveyer, which in turn trims it or discharges it at any point in the coal store or yard. The conveyer can also be arranged to trim direct into the storage hoppers used over a bench of inclined retorts, or into the storage hoppers used to feed a West or Foulis stoker. The conveyer over the store or yard can be made any desirable length, like the band conveyer on Diagram No. 2; and of any desired size, to deal with any quantity of coal per hour.

Diagram No. 4 shows an arrangement of a combined portable elevator and conveyer, which you will, I think, admit is something of a novelty, to trim coal or stack it all over a yard. You will notice that the coal stack is shown walled up all round. The coal is shot from the wagons into the hopper of the elevator boot, and the elevator lifts it into the traversing conveyer, which in turn trims it over the yard, as shown. The traversing conveyer can be made any desired width, to suit any size of yard.

The end elevation of Diagram No. 4 shows the stack walled up, and the conveyer discharging the coal. The side elevation shows the combined elevator and conveyer moving along the yard or the store. The superstructure, as you will observe, is light and simple, and the power can be transmitted to the elevator or conveyer by means of a rope or detaching shaft. This form of conveyer can also be made to unship or be taken to pieces to move from one part of a works to another, when it is not convenient to continue an unbroken line of rails all round the parts of the works where coal can be stored.

Diagram No. 5 shows an arrangement for handling and storing the coke from benches of gas retorts and batteries of coke ovens; and many similar arrangements have been installed to deal with the ashes from boilers and furnaces of all descriptions. In this diagram you will notice that I show a setting of inclined retorts, from which you will observe the coke is falling against a shield, and from there into a coke truck. The coke truck is tipped into the receiving pit over the elevator boot. The coke, before tipping, is generally quenched in the truck; the waste water running off in the usual way. In some cases, however, a tray conveyer to catch the coke is provided instead of the truck; and the conveyer carries the coke and delivers it into the receiving hopper over the elevator boot. Either or both of these arrangements may be adopted in large works to meet the requirements of the retort house. The coke when delivered into the hopper over the elevator, falls into the boot, and is elevated to the revolving or shaking screen, which divides the coke into the desired sizes. From the screen, the coke drops into the conveyer fixed over the large storage hopper, which trims it all over the storage; and the wagons or carts can be automatically filled by actuating doors and levers in the bottom of the storage hopper. An installation of this description, which is considered somewhat unique, can be seen by members of this Association at the gas works at Nelson, Lancs.

Diagram No. 6 shows an arrangement of conveyer with an automatic dipping end, largely used in connection with batteries of coke ovens, to deliver the coke into the wagons or barges with a minimum of breakage. A similar system is applied with advantage in gas works. The coke is carried in the usual way on the horizontal part of the conveyor, and the end is made to dip and rise at will by means of counterbalance weights, and the special arrangement of drive which any members of the Association can see in detail during their visit to Smethwick this afternoon.

An Important Water Works Decision.

The *Engineering Record* publishes the full text of an important decision of the Supreme Court of Illinois, written by Chief Justice Phillips. As its lines will apply along gas properties too, we deem the decision to be worth reproducing in our columns. It will be seen that the city of Danville made a contract with the Danville Water Company for the use for 30 years of an indefinite number of hydrants at a scheduled rate of payment. Before the expiration of the term the city tried to break the contract and force lower prices on the company. The latter continued to supply water, but resisted the attempt to scale down its income arbitrarily. Justice Phillips has sustained its view of the matter, and, in his decision, reminds the city of Danville that it has no more right to break a contract than a private party.

On the 9th day of November, 1882, an ordinance was passed by the City Council of the city of Danville, by which the Danville Water Company was granted a right to construct and maintain a system of water works, and the privilege of using the streets and alleys of said city for that purpose for a term of 30 years, and by the ordinance the character and capacity of the works and source of supply and other details were named. Within the time limited by the ordinance the water company constructed its plant, and has since maintained the same. By that ordinance the city rented of the company 100 fire hydrants for the term of 30 years, at the rate of $75 each per annum, and agreed to pay that sum as rental thereafter during the term, payments to be made quarterly. It was further provided that rentals for hydrants thereafter taken should be at the rate of $62.50 each per annum for the next 40 hydrants, and for all in excess of 40 the rate should be $50 per annum for the succeeding 30 years. Subsequently ordinances were passed providing for the extension of water mains, and for renting the hydrants until the number reached 158, at the rates fixed in the original ordinance of June 24, 1894, the rental on the first 19 of 34 hydrants thus taken was reduced from $62.50 to $50 and all further hydrants from $50 to $40 with the consent of the company. In January, 1895, the City Council adopted ordinance No. 517, which recites that it is passed under authority of an Act approved June 1, 1891, entitled, "An Act to enable cities incorporated under any general law of this State to fix the charges of and for the supply of water furnished by any corporation to any such city and the inhabitants thereof," in force July 18, 1891, which provides: "That the incorporate authorities of any city now or hereafter incorporated under any general or special law of this State in which any individual, company or corporation has been or hereafter may be authorized by such city to supply water to such city and the inhabitants thereof, be and are hereby empowered to prescribe by ordinance the maximum rates and charges for the supply of water furnished by such individual, company or corporation to such city and inhabitants thereof, such rates and charges to be reasonable and just. And in case the corporate authorities of any such city shall fix unjust and unreasonable rates and charges the same may be reviewed and determined by the Circuit Court of the county in which such city may be."

In pursuance of that statute an ordinance was passed which provides that the city shall continue to take the supply of water but shall only pay the sums as fixed by that ordinance—viz., $50 per hydrant for 100 hydrants, instead of $75 per annum; $50 per hydrant for the next 18 hydrants, instead of $62.50 each. For the next 21 hydrants the rental is not changed—viz., $50, and for the last 18 it remains the same—viz., $40. This ordinance provides that within five days after it is approved by the Mayor the City Clerk shall deliver to the Superintendent of the Water Company a certified copy of the ordinance, and that the rates therein fixed shall take effect May 1, 1895, and if the Water Company should feel itself aggrieved, or that the rates fixed were unreasonable, the Corporation Counsel was authorized to enter the appearance of the city at the February term, 1895, of the Circuit Court, so that the matter might be promptly determined and the rates reviewed. Following the first day of May the Water Company, having been notified as required by the ordinance, still continued to furnish a supply of water through the said 158 hydrants until the expiration of the quarter—viz., August 1, 1895. This suit was brought to recover the hydrant rentals specified by the first ordinance, and the subsequent ordinance accepted by the said Company, the declaration was in assumpsit reciting the ordinances

under which a right was claimed to recover rental amounting to $2,630.62. To this declaration special pleas were filed alleging in the first and second that the rates fixed in the original ordinances set forth in the declaration were unjust, unreasonable and excessive, and were in excess of a reasonable compensation for the services rendered and the water furnished; that this was true at the time said ordinances were passed and was still true; that the Water Company was engaged in a public capacity in supplying said city and its inhabitants with water, and that the rates fixed in the declaration were voidable, and being so the City Council, on January 17, A.D. 1895, passed Ordinance No. 517, which was duly approved by the Mayor, and is set forth *in haec verba*. This ordinance fixed the hydrant rental beginning May 1, 1895, at $50 per hydrant for the first 140 of said hydrants and at $40 per hydrant for the balance—viz., 18, and that notice of the ordinance was duly entered and acknowledged and that this ordinance was passed under authority conferred by the act of June 1, 1891, aforesaid, as well as by virtue of other legal authorities, and that the rates fixed in said ordinance are just and reasonable and amount to the sum of $1,930, which sum the city is willing to pay. This defence as to all except the $1,930 was presented by each of the first two pleas, the only difference between them being that in the first plea the authority to pass ordinance No. 517 is put solely on the power conferred by the statute of 1891; while in the second the facts are alleged that rates fixed in the original ordinance were unreasonable and in excess of the statute and voidable; the third plea alleges the tender of said order for the sum of $1,930. To special pleas the Water Company filed its demurrer, which the city asked to have carried back to the declaration, because it had not averred there had been a compliance with the requirements of Section 12, Article 9, of the Constitution, which provides that municipal corporations incurring any indebtedness should provide for the collection of annual tax sufficient to pay the interest on the debt, and the principal within 20 years, and alleged, second, that no contract could be made by the city until an appropriation had been made concerning such expense. The trial court sustained the demurrer to the pleas and refused to carry back to the amended declaration, and judgment was rendered against the city for $2,701 and costs. Exception was taken to the ruling of the court and rendering the judgment, and in overruling the motion in arrest, and the appellee sues out this writ of error.

By this proceeding two questions are presented for adjudication in this Court. First, is ordinance No. 517 a valid enactment? and, if so, it was error to sustain the demurrer to the first and second pleas; and second, whether the allegation to the declaration showed a valid promise by the city for the payment of the rental for 158 hydrants in the manner authorized by law. By Section 1 of Article 10, chapter 24, it was provided: "The City Council or Board of Trustees shall have the power to provide for the supply of water by the boring or sinking of artesian wells, or by construction or regulation of wells, pumps, cisterns, reservoirs or water works, and to borrow money therefor, and to authorize any person or private corporation to construct or maintain the same at such rates as may be fixed by ordinance and for a period not exceeding 30 years; also to prevent the unnecessary waste of water; to prevent the pollution of the water and injury to such wells, pumps, cisterns, reservoirs or water works."

This section was in force at the time of the adoption of the original ordinance by which the contract was made for the 100 hydrants at $75 each, and the additional hydrants at a specified rate. The right is granted by the foregoing section to contract for a supply of water for a period of 30 years, and the right to contract for a supply necessarily authorizes the right to fix the contract at which the supply shall be furnished.

By the provision above quoted the State invested the municipality with power to make and contract for a supply of water for a period of 30 years, and it would be difficult to comprehend the meaning of terms authorizing a contract to be made for a supply of water to be furnished without including therein the right to fix the price at which it should be so furnished. This power conferred by the legislature sanctions a particular act and authorizes it to be done. Where a contract is made to accomplish that act thus sanctioned, it must be held valid. The power of the State in regulating, governing and conferring power on municipalities is supreme, but where it confers a power with reference to a contract and that power is once exercised it is subject like other legislative powers to the authority of the State and Federal constitutions, and when it invests a corporation which derives its power from the State with the power to make a contract, and that power is exercised, the legislature is thereafter excluded from annulling or rendering invalid such contract. Such a contract is only subject to judicial construction, and is sacred from interference by the legislative power. Such a contract made by a municipality under the power conferred by a State legislature cannot be impaired, and has thrown around it the positive restrictions of the Federal and State constitutions. Citizens Water Company *vs.* Bridgeport, etc., Company, 55 Conn., 1; Rockland Water Works Company *vs.* Camden, 80 Me., 544; N.O. Water Works Company *vs.* Rivers, 115 U. S., 74; St. T. W. W. Company *vs* N. O. W. W. Company, 120 U. S., 64.

In a contract running for a period of years for the supply of water, a different rule is invoked from that which occurs in a case where a contract is made for lighting a city. In the one case the legislature has conferred the power on the municipality to contract for a period of years; in the other it is silent as to such power. The municipality having no power other than that granted by the legislature, is limited in restriction to the powers granted and known conditions of most of the cities and villages of the State of Illinois, which necessarily must exercise the power of providing a means of supplying their inhabitants with water, and could not do so without conferring privileges and entering into contracts in many cases, and the legislature, deeming the power to contract for a period of years necessary to secure such supply of water by the enactment above quoted, exercised a power not restricted by the constitution of the State of Illinois, and conferred upon the municipality a right to contract for a term of years, and the necessary construction of the section heretofore quoted is that it conferred the power to contract for a supply of water, and fix the price thereof for a period of 30 years. Subsequent to that enactment, by an act approved July 1, 1885, entitled, "An act to enable cities, incorporated towns and villages to contract for a supply of water for public use, and to levy and collect a tax for the water so supplied," it was provided "that in all cities, incorporated towns and villages, where water works have been or may be hereafter constructed by any person or incorporated company, the city, town or village authorized in such statute, incorporated towns and villages may contract with such person or incorporated company for the supply of water for a period not exceeding 30 years."

No reasonable construction can give the former section, with reference to the period of contract, a different construction from that of the latter act, and both authorizing and fixing of a price at which the water supplied shall be furnished. It was not an error to sustain the demurrer to the first and second pleas.

The contention that the declaration does not set forth a binding promise because it contains no averment that before or at the time of making the contract a provision for the collection of a tax to meet payments as they might fall due was provided for, or that no appropriation had been made before or at the time of making the contract, cannot be sustained. The constitutional prohibition against going into debt beyond the amount limited by the constitution does not prevent the making of contracts for supplying an article of daily consumption at a stipulated price to be paid for, and was paid for by annual appropriations levied and collected for that purpose at stated intervals after delivery, and that does not create an indebtedness within the meaning of the constitution. City of East St. Louis *vs.* East St. Louis Gas Light and Coke Company, 98 Ill., 415.

The sufficiency of the declaration in stating the cause of action must be well pleaded when it violates no provision of the ordinances of the city or the constitution and laws of the State of Illinois, and if the city has the power to make a contract for a period of 30 years under the legislation of the State, and that legislation is not unconstitutional, then it must be held that the declaration states a cause of action, and the power having been conferred upon a municipality to enter into a contract for such a length of time for an article of daily consumption, it is not the incurring of an indebtedness which requires an appropiation made providing for the whole period of 30 years, and to so hold would place a restriction on the power of municipalities to contract and would obstruct public wants, retard improvements and not be consistent with the spirit and meaning of the act. It was not error for the Court to refuse to carry the demurrer back to the declaration. From a consideration of this record the judgment of the Circuit Court of Vermilion County must be affirmed.

The Caucasus Oil Field in 1897.

The Caucasian oil industry has labored this year under decidedly adverse conditions. The export of illuminating oil has decreased greatly. While in August of last year 600,000 barrels of oil were exported from Batoum, the shipments for the same month of this year amounted to only 280,000 barrels. The chief cause for this decline in the Russian

oil exports, says an Austrian exchange, from which this is translated for the *American Manufacturer*, is the active and successful competition of America, which drives the Russian oil from all the markets of Europe. Last year the Russian oil could maintain its position in the markets of the far East; to day even there it is being crowded out by the Americans and other competitors. No Russian oil was exported to the Sunda and Philippine Islands, to Zanzibar and Vladivistok, while the exports to India, China and Japan have shrunk considerably (457,700 cases in August, 1897, as against 732,100 cases in August, 1896). For September and October only sales for China, India and Japan were recorded, all the other markets were supplied by America.

Owing to the small demand from abroad, the price for illuminating oil has fallen to a level which excludes all profit to the refiner. The price f.o.b. Batoum was quoted right along at 26 to 27 kopeks per pood (about $1.30 to $1.35 per barrel), which corresponds to 4 to 5 kopeks per pood (20 to 25 cents per barrel) at Baku. As the price of crude oil is comparatively high, a pood of oil costs the refiner 13 kopeks (65 cents) a barrel. It is, therefore, no wonder that two-thirds of the Baku refiners, that is all those not producing their own crude, were compelled to close their establishments. Up to September, when the demand slightly improved, a marked quietness hung over the the Russian oil market. In August a whole week passed without any sale being reported at Baku. In consequence, large stocks have accumulated at that place. On September 13, stocks at Baku were as follows:

Illuminating oil	700,151	barrels.
Distillate	169,790	"
Crude oil	1,288,382	"
Lubricating oil	130,778	"
Residuum	518,761	net tons.
Other products	17,758	"

Notwithstanding the poor condition of the market for refined oil, and its declining production and export, crude oil has continued firm at 8 kopeks per pood (40 cents per barrel); fluctuations varied by fractions of 1 kopek, originating from the changing conditions of navigation on the Volga river. Residuum commands as high a price as crude oil, as both are in great and steadily increasing demand for fuel purposes.

The production of crude in the Baku field (Aspheron peninsula) continues to be up to the average, amounting in July to 3,279,510 barrels, in August to 3,086,460 barrels. As compared with 1896, this year shows an increase in the production, which amounted for the first seven months of the current year to 24,578,884 barrels, as against 21,845,967 barrels for the same period of 1896.

The Refiners' Syndicate, whose agreement expired October 13, has disbanded, although all parties concurred in the opinion that only joint action could enable them to cope with American competition. In view of the difficult position of the refiners, freight rates for oil destined for the German markets have been reduced greatly by the Russian Government, and the German railways have promptly followed suit, so that Russian oil might be enabled to compete more successfully with the German American Petroleum Company which still dominates the German market. A company with a capital stock of 2,000,000 roubles is being organized at St. Petersburg for the purpose of transporting oil in tank steamers by way of the Maria Canal system from Baku to St. Petersburg. It is expected that in this manner oil prices at the latter market will be reduced 30 per cent. and the competition of American oil in the Baltic seaports overcome.

Notwithstanding the unfavorable tendency of the petroleum market, an actual drilling epidemic prevails at present in the Caucasus. One new field after the other is being discovered. The cuts for the newly graded line of the Petrowsk and Derbent Railway show the existence of oil for the whole distance. At Tiflis, the capital of Transcaucasia, drilling will be commenced soon. Operations along the Petrowsk and Derbent Railway have not been very successful so far. Very few good producers have come in in the new fields this year. The Anapa field promises better results according to the latest explorations.

The production of the Grosni field has declined during the last few months. The daily production has varied between 4,000 and 7,000 barrels, while 10,000 barrels was considered the average. The production for the first six months of 1897 amounted to 1,500,000 barrels.

Artificial Stone.

Engineering says that works have been established at Woking, England, for the manufacture of stone by a process patented by Mr. William Owen, in which sand and lime are subjected for a period of 35 hours to a hydrostatic pressure of 60 pounds on the square inch; a distinctive feature being that all air is driven from the water which is used by raising its temperature to boiling point before it is pumped into the pressure chamber. This, it is contended, obviates any blow holes or other similar defects in the stone. The location of the works at Worplesden, near Woking, was determined by the extensive deposits there of Bagshot sand, having about 98 per cent. of quartzose sand with a little of silicate of alumina. By means of elevators the sand is passed first into a long cylinder placed at a slight gradient in the flue from the boilers of the works. Around the interiors are vanes, and as this cylinder is rotated by worm and pinion gear, the sand is well tossed about and thoroughly dried. It falls into the boot of an elevator which raises it to a hopper having two divisions—one for the sand, the other for the lime, which is similarly elevated from a Krupp crushing mill. At the bottom of the hoppers is a propeller so constructed that by its rotation it takes 12½ of lime to 87½ of sand (by weight), and these fall into a rotating cylinder placed at an angle and having internal vanes. The heated sand tends to dry the lime. The sand is made to pass through a 45 to 50 mesh, and the lime through a 70 mesh sieve. The two components, after being mixed, pass into moulds, constructed of steel plates bolted together. The largest in use at Woking is 10 feet 6 inches long, 4 feet 10½ inches by 15 inches, the weight of the resulting block of artificial stone being 4 tons 8 cwt. Of course, any form or any ornamentation may be "cast."

Cast iron was found unsatisfactory for the moulds, as the blocks of sand adhered to it. The moulds with the sand are carried on bogies on rails into cylinders 6 ft. 6 in. in diameter by 10 ft. 6 in long, excluding the dished ends. They are built of steel and riveted, the front end being bolted on. Water at 290° to 310° F. is pumped in until a pressure of 60 lbs. to the square inch is insured, while at the same time steam of 100 lbs. pressure is maintained in coils fitted to the inside of the cylinders. This continues for 35 hours, when the water is withdrawn. But the steam heating is continued for 15 hours, and then the block is allowed to cool slowly. It greatly improves with exposure to the atmosphere, being in a month able to withstand a pressure of 4,000 lbs. on the square inch. Messrs. R. R. Tatlock and Readman, chemists in Edinburgh, have made several tests with stones thus made. Pieces were heated to redness and then dropped into cold water and left 30 minutes, and again heated and left to cool slowly, without any breaking up or disintegration. They were next saturated with water, placed in a beaker in a freezing mixture for three hours, the temperature being 22° F., and then subjected to a bath of hot water. This was done several times without injurious effect. Of course time only can determine practically the weathering qualities, but the results quoted go a long way to confirm the anticipation of success. The stone may be "worked" in any way, and can be made perfectly uniform in shade, so that the builder does not require to choose his pieces for ornamental treatment.

Coal Dust Briquettes.

The *Journal* of the Iron and Steel Institute says that briquettes are being made with coal dust and bisulphite of lime solution, a waste product of paper mills at Gömor, in Hungary, where there are also some charcoal fired blast furnaces, the waste gases from which are used to concentrate the solution. When the latter has attained the desired degree of concentration, it is led into a briquette machine, where it is intimately mixed with the coal dust. The briquettes thus obtained acquire great hardness on drying. At first they were used as fuel instead of wood, and inasmuch as they gave out no disagreeable effluvium in burning, it was afterwards decided to use them in the blast furnace. The injurious action of the sulphur contained in the briquette was eventually counteracted by using a sufficient quantity of calcareous flux, causing the sulphur to pass of in the slag; and it appears that the results are now quite satisfactory.

In Velna's process of making briquettes, petroleum residue or mineral tar is used as binding agent for culm and small coal. Briquettes are thus made for industrial purposes and for gas making. For coking, the mixture is not made into briquettes, but is charged into the oven in lumps. From 5 to 10 per cent. of the binding agent is used.

At a briquette works near Kausche, in Germany, the air from the drying ovens is passed through roomy brick chambers so as to deposit dust, which is then returned to the ovens.

The plant at Blanzy, used for making briquettes, now consists of two works, one with three Révollier presses and the other with four Biétrix presses. For the former, 9 per cent. of pitch is mixed with 91 per cent. of coal in a pugging mill heated with steam. The pressure in the press is 142 to 156 pounds per square inch. The briquette then contains

about 4 per cent. of water. It is left on a conveyer belt for 40 minutes, and then loaded into railway trucks. Two hundred and forty tons are made daily. The Biétrix presses make 330 to 340 tons daily, one briquette at a time.

Canadian Insurance Regulations Respecting Acetylene.

The Canadian Insurance Underwriters have issued the following regulations governing the use of acetylene gas in Canada:

1. That no calcium carbide or gas generating machine be allowed in any building insured.

2. That generator must be placed in a separate building, constructed as follows, viz.: Walls solid brick or stone not less than 9 inches thick; roof entirely of iron or other fireproof material; floor of cement or concrete, with slight upward slope from door; entrance to be an iron or standard fireproof door, no windows or other openings except for ventilation, which shall be through an iron pipe not less than 6 inches in diameter protected sufficiently through the roof and turned down at the outlet. Generators must be provided with escape pipes of sufficient capacity to allow gas to escape freely at a pressure not exceeding 5 inches of water. Care must be taken to deposit residue from generator at a safe distance from any building.

3. That generator building must be located at least 10 feet from a brick or stone building, or 20 feet from one of any other construction.

4. That the storage of calcium carbide be limited to 300 pounds, to be kept in air-tight metallic cases not exceeding 100 pounds capacity, and confined to the generator building.

5. That if the above regulations are not fully observed, double rates must be charged.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, Nov. 10th, 1897.

That Gas Meter.—Comparative Cost of Various Gases in the Gas Engine.—Some Accidents.—Automatic Meters on the Continent.

At one time reporters and note books were considered to be derogatory to the dignity of the Houses of Parliament, and the published reports of the proceedings which appeared in the papers were written from memory. The celebrated Dr. Johnson was much in request as a reporter on account of his extraordinary qualifications in this respect. Once, when in company, someone remarked on the difficulty of writing without bias under such circumstances, and the Doctor acknowledged that he took care that "the Whigs did not get the best of it." And when a gas company is unfortunate enough to get into the law courts, as against an individual, there is frequently a similar kind of disposition exhibited on the bench. Not only is the company regarded as inclined to aggrandizement if allowed the chance, but the fact that it is probably rich and powerful, with large funds at command, and that if the verdict goes against it the dividends will be paid as before, and no personal hardship or suffering will be experienced, appears to be held prominently in view. With an individual the issues may take a very different shape, and a contrary verdict, carrying costs, may cripple him for years to come, and one can scarcely find fault with a disposition to protect the weaker party, even at the expense of the stronger. This disposition has to be reckoned with before going to law, and many gas companies prefer to put up with serious losses rather than to lay the case before the local bench, although confident that the strict interpretation of the law is on their side. With these circumstances in view, it is satisfactory to note that a London gas company has lately secured a verdict against a customer who disputed the accuracy of his meter, even after it had been tested in the usual way. The gentleman in question had a number of gas fires in his house, and the consumption cannot therefore be judged by rules that might apply to lighting. When gas was used for lighting only, the consumption was fairly comparable year by year, but a very different condition of affairs comes in with the introduction of gas fires, both heaters and cooking stoves. A gas fire, for example, may not be used at all for a month together, because the weather is unusually mild, or it may be kept going night and day through a severe frost. As regards the cooking stove, half the family may be away for weeks at a time, or, on the other hand, the house may be full of visitors. In the former case, it was possible to form an approximate estimate from the records of previous seasons, as to the proper charge to be made for any period during which the meter was not registering or its indications were in dispute. But under modern conditions, if the meter is not to be relied upon, it is absolutely impossible to make an estimate. Of course, if we start on the 1st of January, and keep a record of the hours of consumption on each appliance, there would be some data to figure on at the end of the first quarter. But, under ordinary circumstances, it is absolutely impossible for anyone to come in, say at the end of April, and decide what is or what is not a fair charge for the three months ended March 31st. The rejection of the meter indication is, therefore, a serious matter for the gas company. If the consumer is to be entitled to say whether the meter is right or wrong, the gas company is entirely dependent upon his accuracy and honesty, which is not a safe position. Nor are matters much improved by going before a magistrate, as that official has not personal knowledge or experience in such matters, but has to depend upon how much or how little the consumer chooses to disclose. Even a board of experts, armed with authority to demand and enforce evidence on oath, could not get very far into the actual circumstances of hours of consumption, burners in use from time to time, and other things which go to make up the quarterly account. In this case the company claimed for the full amount indicated by the meter, with a slight deduction on account of the official test, which showed the instrument to be 2.46 per cent. fast. The consumer's contention was that the charge was absurd, outrageous, etc. The magistrate, however, ordered him to pay it.

Some experiments have been tried at Birkenhead by Mr. T. O. Paterson, the Engineer of the Corporation Gas Works, in conjunction with Messrs. Crossley, the well-known makers of gas engines, on the comparative cost of coal gas, Dowson gas and blue water gas for use in gas engines, and they have arrived at the following figures: Coal gas, 86; Dowson gas, 27; blue water gas, 12. From this it would appear that the uncarbureted water gas is the cheapest fuel known, being more than twice as cheap as Dowson, and seven times as cheap as coal gas. These figures only refer to the actual cost of the fuel, but in practice there are many other conditions to be reckoned with. Of the three gases, coal gas is the cheaper for distribution. It is stronger or richer than the others, and although the above figures may be correct for experiments tried close to the generators, the results would be very different if the engines were two miles away, and the cost of distribution was reckoned in. Every user of power cannot depend upon having a generating plant upon his premises, or even in the immediate vicinity. The generating plant further means sinking a considerable amount of capital, and many users of power would prefer to pay a little more for their gas than to have £500 or £600 invested in plant. In some cases, again, they could not spare the space. So that, taken all around, the local gas company will be regarded as furnishing the best and most convenient agent for engines up to 10 or 15-horse power at any rate.

The month of October has been marked by a larger number of accidents, fatal and otherwise, than is usual in the gas industry. Considering the variety of operations carried on and the number of men engaged therein, it enjoys a remarkable freedom from casualties, and especially when we remember the quantity of hot coke that is dealt with from hour to hour there is room for congratulation that men are so seldom injured by burns. There have been two fatal accidents in connection with purifiers. At Warrington two men were killed by the sudden falling of a purifier cover, which had been hoisted and temporarily suspended above the vessel while some repairs were affected. Something failed in connection with the suspending machinery. The other was at Wrexham, where the seal of the center valve blew on account of back pressure in the purifiers, and the assistant manager, acting against the advice of his senior officer, went down single handed into the space or cellar under the purifiers, with a view of stopping the leak of gas. It soon became apparent that he was overcome, and two men who went to the assistance and rescued him after some difficulty, were themselves rendered unconscious for some time, but recovered. Artificial respiration was resorted to, in the first case, and maintained for one hour, but without avail. Then the bath heater has claimed one more victim. A tradesman at Oxford was found dead on the floor of the bath room, the air being heavily charged with gas which had escaped from the heating stove. There was a device by which the opening of the lighting door also turned on the gas and as this had been done but no light applied, it was surmised that the victim, who had not been in good health for some time, must have been suddenly seized by some indisposition while in the act of lighting the stove in the usual way. And inhalation of gas is not definitely stated to be the primary cause of death.

The subject of prepayment meters has attracted the attention of the German Gas Association, who appointed a committee to inquire into the matter. The report presented in response to this request covers not only Germany, but most of the countries in Europe as well. So far as

Germany is concerned, the only instance quoted is that of Carlsruhe. Having observed that scarcely any of the smaller houses in the town used gas, the directors decided to put in coin meters, gas fittings and stoves up to the value of £5 10s. per consumer free of cost, but the results of this decision are not stated. In France the coin meter has found favor, 30,000 of one make alone having been sold, besides other kinds. The gas companies go to an expense of about £4 10s. per consumer, and require a guaranteed consumption of 5,000 or 6,000 cubic feet per annum as a minimum. In some cases the gas is supplied at differential rates according to quantity consumed. In Italy the coin meter has been introduced at Rome and Genoa. At Geneva the system has been introduced, with free service pipes, at a minimum consumption of 7,000 cubic feet per annum, while the extra "loading" is 1s. 4d. per 1,000 cubic feet. It has also been largely adopted in Holland, where the average cost of installation is £4 7s. per customer. The views as to extra price as compared with the ordinary rate appear to be very moderate, and in some towns no distinction is made. This may account for the fact that the average consumption per consumer in Holland is very high, amounting to 20,000 cubic feet per annum in some towns, and averaging nearly 15,000 cubic feet over the whole. An interesting feature is that the expression "prepayment" is found to give offence in some cases, and the report therefore recommends that the term should not be used for dealing with the customers. It is a very simple matter to conciliate public opinion in this respect if necessary, but in England the distinctive feature of prepayment is rather approved of than otherwise, and I have never heard that any objection was raised against it. A discussion followed the reading of the paper, in the course of which it was mentioned that the common practice of having two prices, one for "day" and one for "night" gas, was a difficulty in the way of introducing coin meters in Germany, the difference in some cases being as much as 30 per cent.

It was also stated that in Germany two movable locked boxes are provided for each meter, and marked with its distinctive number. One set of these is kept at the office, and the collector, instead of gathering in the coppers at each meter, starts out with a set of empty boxes, which he gradually replaces, one by one, for the full ones, at the same time booking the index of the meter. The actual conditions of each meter are thus carefully controlled at the headquarters, the contents of each box being compared with the meter book.

Any false coin or other discrepancy is thus detected, and so far the system is an advantage. But the labor of collecting and replacing boxes must be considerable. Two locked boxes to each meter adds to the cost. And it was not stated what precautions are taken, if any, to guard against stealage. The locked receptacle must be secured to the meter in some way, or perhaps the rule is to fix the meter in a safe place inside the house. If an unsatisfactory feature is found the consumer is warned, and on the second occasion the meter is removed. But the consumer can scarcely be held responsible for the box after it has left his premises. The box system appears to be quite as susceptible to fraud as the ordinary one, and must certainly increase both the first cost and the working expenses.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

REPLYING to several inquiries received within the last three weeks, as to when the sixth edition of "Newbigging's Handbook" would be ready for the market, we may say that in all probability quite early in 1898 it will be on sale.

THE proprietors of the Montclair and Bloomfield (N. J.) Gas Company have informed the authorities that hereafter the gas supplied to the public buildings of Montclair and Bloomfield will be billed at the rate of $1.50 per 1,000 cubic feet.

THE recently incorporated Peoples Gas Company, of Irvington, N.J., has also been authorized to supply gas in the adjoining borough or village of Nutley.

A CORRESPONDENT says: "Judge Speer, in the United States District Court, for the Southern District of Georgia, about a fortnight ago passed an order naming the manner in which the Receiver's certificates should be issued for carrying out the improvements for the Macon Gas Light and Water Company. A reserve fund shall be kept for paying interest on the first and second mortgage bonds; $15,000 shall be paid to take up the certificates in one year; $15,000 in two years; $20,000 in three years; $25,000 in four years; and $25,000 in 5 years. The certificates shall bear interest at the rate of 6 per cent. per annum, payable semi-annually. They shall be a lien upon the water plant, the gas plant, the electric plant and on all other property and assets and franchises of the Company, and also on the water plant (to be erected from the proceeds of the certificates) superior in rank to all the outstanding obligations of the Company, except the first and second mortgage bonds, aggregating $115,000. This issue of certificates is not intended to affect in any manner the lien of the first and second mortgage executed to secure said bonds. The property is ordered to be turned over to the Company by the Receiver upon the completion of the improvements."

WE understand that the plant and franchises of the Michigan City (Ind.) Gas Company have been purchased by a syndicate of eastern capitalists, the chief members of which are residents of Portland, Maine.

THE following slip, taken from the *Daily Patriot*, of Charlottetown, Prince Edward Island, of date of November 13, was forwarded by a correspondent: "A procession of teams loaded with plant and machinery for the Company which succeeded to the properties of the Charlottetown Gas Light Company, attracted considerable attention the other day. The first team and dray carried an immense steel case holding the station meter for the new works. The other drays, perhaps a dozen, were loaded down with general machinery for the plant. Manager Lordly, C.E., and the Secretary (who served the old Company for many years), Mr. Lemuel McKay, were on the team behind the big meter, and the smile on Mr. McKay's face seemed to indicate that his hopes had been at last realized and that the millennium had really arrived. Now and again a crowd of small boys would give a cheer as if they realized that the arrival of a new gas plant had not been a yearly occurrence in Charlottetown. The new Company has made another departure which will prove advantageous, and that is the opening of an uptown office and showrooms. The new premises are in the Morris Building, Queen street, and they are handsome and commodious. Here various kinds of illuminating devices are displayed, as well as cooking and heating apparatus, and the displays are bound to attact the attention of the residents. Despite the wet and otherwise unseasonable weather, the Company has been quite active in finishing up the main extension and service pipe work that was planned in connection with the general rehabilitation of the Company's system. Many new consumers have been taken on."

THE Cincinnati (O.) *Com. Tribune*, of the 20th inst., contained the following: "The end of the long-drawn-out controversy about the right of the city of Covington, Ky., to sell its alleged option on the purchase of the plant of the Covington Gas Light Company is in sight. Yesterday morning Mayor Rhinock approved the resolution passed by the General Council calling for bids on its option, and soon after Attorney F.W. Bryan entered suit in the Circuit Court, asking that the city be restrained from proceeding further with the proposed sale. The petition filed on behalf of the Gas Company is lengthy and exhaustive in recital of the facts in the case. After quoting the original 50-year contract with the city, and the resolution passed by the Council in 1867, to exercise its right of purchase, it gives the history of the attempt to purchase the plant in 1869, so far as it proceeded. After the selection by the city of two of its appraisers—Col. Thornton Marshall, of Augusta, Ky., and J. P. Jackson, of Newport—and by the Gas Company, of J. D. Hearne and J. J. Hayden, both of Cincinnati, these four unanimously agreed upon General James S. Speed, of Louisville, as the fifth man, the city having insisted that no resident of either Newport or Covington be selected. The only question for consideration by the appraisers was: 'What are the Covington gas works worth, January 1, 1869, to be run according to the terms of the contract, with the city of Covington, for the balance of the 50 years?' On this proposition the disagreement came which resulted in the city abandoning the proposed sale. The city insisted that the value should be fixed according to the actual cost of purchasing material for and establishing of the plant; the arbitrators figured in the value of all contracts, including the one with the city. As the contract which gave the city the right to purchase gave the arbitrators the right of deciding terms, the city stopped further proceedings, it being evident that the purchaser would have to pay a very much larger sum than contemplated. When the purchase scheme was abandoned by the city the Gas Company insisted on going ahead, but failed in the effort. The final result was that the salaries of the five arbitrators and their clerk, amounting to $5,050, were paid in equal parts by the city and the Company. Here the matter rested, until the recent agitation and the introduction of the Hiles resolution to sell the city's option to private parties. Attorney Bryan maintains that the contract, while reading that the city can purchase, by giving one notice in 1867 and every five years thereafter, does not mean that every five

years it can proceed until a certain stage and then stop, thereby entailing expense at each period for both city and Gas Company. He says the abandonment of its declared purpose in 1867 to purchase forfeits its right for the remainder of the time of the contract. Also, that the intent of the purchase clause was to benefit, if possible, the people, and the privilege of purchase does not carry with it the right to sell to other parties that privilege. In the petition he states that the present action of the General Council is tending to depreciate the value of plaintiff's property and throw a cloud upon its title. Judge Perkins granted a temporary injunction and set the motion of the city to dissolve the injunction for a hearing on the 23d inst. Attorney Bryan and City Solicitor Shaw have agreed that, whatever Judge Perkins decision is, the case will be taken at once to the Court of Appeals, by which arrangement the question will be decided by the final Court in time, should the city win, to allow for the advertising for proposals during December. When asked for a statement, Mr. Bradford Shinkle, President of the Gas Company, said that he knew nothing he cared to say, beyond that contained in the petition, which might interest the public. He was pleased that matters had reached that stage where the Company could bring the question into Court and is confident of the final result. The Company had intentionally maintained silence while the charges and abuse showered upon it by some members of the Council were being put forth, not caring to enter into a controversy which could result in nothing. The Court of Appeals, he said, would have to be the final arbitrator of the question, and the Gas Company is as anxious as the City Council to have it settled."

THE New York, Rutherford and Suburban Gas Company, of Rutherford, N. J., is endeavoring to secure a franchise permitting it to extend its mains to and through the public ways of the adjoining borough of Carlstadt.

THE Peoples Gas Improvement Company, of Trenton, N. J., has filed its bond in $25,000 with the City Clerk of Trenton, to comply with the provision of the ordinance requiring a bond to indemnify the city against damage in tearing up the streets in the laying of pipes, etc.

THE very many friends of Mr. Irvin Butterworth, the Manager of the Columbus (Ohio) Gas Company, will rejoice heartily over the fact that he has been restored to complete health.

THE Directors of the Gilroy (Cal.) Gas Light Company have perfected the following executive management: President, L. A. Whitehurst; Vice-President, A. Robinson; Secretary, C. E. Whitehurst.

IT is said that Mr. Jno. A. Manley proposes to operate a gas works in Rossland, British Columbia. We do not quite understand how such an enterprise could be carried on profitably in the place named.

THE California Ransom Gas Machine Company, to "build gas machines in California," has been incorporated by Messrs. G. L. Hergert, V. J. A. Roy, Joseph Britton, H. Marshall and J. Sproule. It is capitalized in $100,000.

A CINCINNATI newspaper of recent date, in mentioning a rumor prevalent in that city, that the Cincinnati Gas Light and Coke Company had been dickering with the proprietors of the Cincinnati Edison Electric Light Company, with a view to acquiring the business and property of the latter, says the matter of such negotiations has been referred to General Hickenlooper for an opinion. The General is quoted as having said: "No negotiations of any kind, direct or indirect, are going on between the two Companies. None of our stockholders, so far as I know—and I believe I do know—own any of the Edison stock, nor has it been offered to them. We have no interest or relation of any kind with them, and know nothing of their affairs. This can be printed as an authorized statement from us."

IN the reorganization of the gas interests of Buffalo, N.Y., the ollowing officers were chosen to represent the new proprietors: Buffalo Gas Light Company: Directors, Emerson McMillin, E. Howard Hutchinson, Henry Seligman, Pascal P. Pratt, Stephen Peabody, B. C. Rumsey and W. F. Douthirt; President, Emerson McMillin; Secretary, J. Krumholz; Assistant Secretary, W. F. Douthirt. Buffalo Mutual Gas Light Company: Emerson McMillin, Geo. P. Sawyer, Stephen Peabody, Charles Barrick, Henry Seligman, J. H. Cowing and W. F. Douthirt; President, Emerson McMillin; Secretary, J. A. Cowing; Assistant Secretary, W. F. Douthirt. Citizens Gas Company: Emerson McMillin, J. F. Schoelkopf, Henry Seligman, Charles A. Sweet, Stephen Peabody, E. W. Eames and W. F. Douthirt; President, Emerson McMillin; Secretary, Peter P. Miller; Assistant Secretary, W. F. Douthirt. The three named companies will not be consolidated, but will be maintained individually, for reasons best known to those in commanding interest. The undertaking Company, which is to be known as the Buffalo City Gas Company, was organized November 23d, with a capital of $7,000,000.

IT is not at all unlikely that the Lansing (Mich.) Gas Company will go into new hands, a reasonable proposition having been made to its proprietors.

THE Mayor of Denver, Col. (Mr. T. S. McMurray), transmitted the following message to the Denver City Council, urging action on the proposition submitted by the Denver Consolidated Gas Company, under which proposition the Company (last October) agreed to terms for the absorption and operation by the city on municipal account of its properties. The Mayor's message (it bears date of the 17th inst.) is as follows:

Gentlemen—On the 3d day of September, 1897, in a communication from the Mayor of this city, addressed to the City Council, I called your attention to the fact that the Board of Directors of the Denver Consolidated Gas Company, had made a certain proposition through the Mayor to the city of Denver, extending an option upon the plant of the Denver Consolidated Gas Company for either a purchase or a lease of the same upon certain terms in said communication set forth. This proposition of the Directors of the Gas Company was subject to ratification by the stockholders of said Company, at their meeting to be held in October, 1897. On the 20th day of October, 1897, a meeting of the stockholders of the Gas Company was held in the city of Denver, at which meeting the proposition heretofore submitted by the Board of Directors to the city was presented to the stockholders of the Gas Company, and by a vote of 13,118 in favor to none against, with 1,187 shares not represented, the proposition of the Directors was duly ratified by the stockholders of said Company. This proposition extends an option good until the 1st day of July, 1901, and thereafter until revoked by 60 days' notice in writing given to the city by said Company. In my judgment it is necessary, if we are to hold the Denver Consolidated Gas Company to the proposition, as set forth in said communication, that action shall be taken by the City Council, providing for an amendment to ordinance No. 128, series of 1891, granting the franchise to said Denver Consolidated Gas Company, in order that this option may be made a part of said franchise, and be thus available for use by the city of Denver at any time between now and the 1st day of July, 1901. On the 21st of October, 1897, I received another communication from a committee of the Board of Directors of the Denver Consolidated Gas Company, inclosing a copy of a resolution of acceptance to be submitted for adoption by the City Council of the city of Denver. The resolution does not, of course, bind the city to anything except to accept the right to hereafter lease or purchase this plant. I attach herewith said communication last named, together with a copy of the resolutions submitted as above and recommend your honorable bodies to adopt said resolution with the following amendment: That in the resolution where it authorizes the Mayor to confer with the representatives of the Denver Consolidated Gas Company for the purpose of formulating an ordinance amendatory of the present franchise of said Gas Company that the words "and the committees of Gas and Electric Light of both branches of the City Council" be added so as to add those committees to the Conference Committee. If this resolution is adopted and the proper ordinance amendatory of the Gas Company's franchise is prepared, passed and accepted by the Gas Company, we will then be in the position of having a right at any time to either purchase or lease this plant, and thus obtain municipal ownership of the great public utility of lighting the city of Denver without any obstacles being thrown in our way from any outside source. I need hardly say that in my judgment this is an end to be greatly desired by the people of the city of Denver, but whether you are ready to assume municipal ownership of a gas plant in the city of Denver at the present time or not, there can certainly be no difference of opinion upon the proposition that it is advisable to secure a four year's privilege of attaining that desirable end when it can be done without any cost to the people of the city of Denver. In other words, the acceptance of this option with the passage of the amendatory ordinance above referred to, does not in itself bind the city to proceed to lease or purchase this plant, but leaves that a matter to be determined hereafter. It does, however, secure us this privilege and puts us in the same position as if this option had been set forth in the original franchise granted to

(*Continued on page* 854.)

THE AMERICAN GAS LIGHT JOURNAL

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CHAS. E. SANDERSON,
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The Market for Gas Securities.

(*Continued from page* 853.)

the Denver Consolidated Gas Company. At the same time, that there may be no misunderstanding of the position of the Mayor upon this proposition, I would say to your honorable bodies that after this privilege has been secured to us, by the amendment of the franchise ordinance of the Denver Consolidated Gas Company, I would recommend that your honorable bodies take up with the City Attorney of the city of Denver the question of power under the present charter to lease this plant, and if it should be found that we have the power, that we should immediately proceed to do so. If, however, it shall be determined that there is a lack of power under the present provision of our charter the matter can be clearly indicated and preparation made for the proper amendment of the city charter at the next session of the Legislature. You will notice that the length of time given us by the option will extend over two different meetings of the Legislative Assembly of the State of Colorado, thus giving us the opportunity to apply to two different Legislatures, if necessary, to secure any power that might possibly be determined as lacking under the present provisions of our charter. The reason that I had for securing the option to lease as well as to purchase was twofold: First, because, as I said in my communication of Sept. 3, the present financial situation of the city of Denver and the fact that we are up to the limit of our indebtedness might for some years to come make it impossible for us to issue bonds to purchase this plant, and that that difficulty could be avoided and all the advantages of municipal ownership obtained by a lease of the plant at a fair valuation. Second, by leasing the plant, instead of purchasing it in the first place, we can make a thorough test of the advantages of municipal ownership of this great public utility, and if we find the test to be successful, we can purchase as soon as we have the financial ability so to do, but if upon the other hand the test should not be successful the city would have avoided obligating itself by a large issue of bonds for purchase or construction of a gas plant. Personally I am a firm believer in the advantages of municipal ownership. Should we lease this plant we can demonstrate to the people of the city of Denver how cheaply gas can be produced in this city and whatever the lowest price may be at which gas can be successfully manufactured and furnished to our citizens, the people themselves will receive the full benefit of the reduction in the price of gas and not have to divide that reduction with any private corporation.

Trusting that this matter may meet with your speedy attention and also with your approval, I am, very truly yours,

T. S. McMURRAY, Mayor.

THE text of the proposition advanced by the proprietors of the Denver Company is appended:

"The Board of Directors and the stockholders of the Denver Consolidated Gas Company make to the city of Denver the following proposition:

"The Company will give to the city an option to purchase the Company's plant, property and franchises, at a valuation to be determined by agreement, or, in case of disagreement, by the decision of one or more competent and disinterested umpires; or, at the election of the city, the Company will give an option to lease, for a period of not less than eight (8) years, the plant and facilities of the Company, at an annual rental of 6 per cent. on such valuation, said rental to be payable in equal quarter yearly instalments.

"Said option to purchase or to lease shall continue until July 1, 1901, and thereafter, until revoked by sixty (60) days' notice in writing, given to the city by the Company.

"In the meantime the Company will reduce its charges for illuminating gas so that the same shall not exceed the following rates, to wit: One dollar and twenty-five cents ($1.25) per 1,000 feet, from Jan. 1, 1898, until such time as the total annual consumption of gas from the Company's plant or plants shall equal 350,000,000 feet.

"One dollar ($1) per 1,000 feet thereafter so long as the annual consumption shall equal or exceed 350,000 feet. The charges for fuel gas at no time to exceed $1 per 1,000 feet. To which rates, however, penalties may be added on default in prompt payment.

"Provided, however, that said option to purchase or to lease shall terminate, and all agreements herein contained shall be void, in the event of, and upon the granting by the city by ordinance or otherwise, to any company, person or persons of a franchise or right to manufacture, sell or distribute gas within the city of Denver. Upon the acceptance of this proposition by the city, and its ratification by the stockholders of the Denver Consolidated Gas Company, the same shall be embodied in an ordinance amendatory of ordinance No. 123 of 1891, granting rights to said Company.

"(Signed) THE DENVER CONSOLIDATED GAS COMPANY, by J. B. GRANT, President.
"Attest: F. W. HERBERT, Secretary."

The Market for Gas Securities.

The market for city gas shares was all on the low side last week, Consolidated, on a large volume of trading, having sold as low as 180. To-day (Friday) a somewhat better feeling was shown by it, the opening having been made at 182, and the closing at 184½. The regular quarterly dividend of 2 per cent. was declared to-day, payable Dec. 15. The books close Dec. 1, to reopen the 16th. Other city shares are about as they were a week ago.

We have no reason to change our belief over the general situation respecting consolidation. It is deferred, perhaps, but it is nevertheless imminent.

Brooklyn Union is in some demand, at 118½, ex div., and its financial position grows stronger every day. A mild sort of a drive was made at Peoples, of Chicago, but the selling was entirely of the professional order, and at a fairly sharp recovery, the shares at time of writing are reported at 92½ to 92¾. Consumers, of Jersey City, is 75 bid, and it is not at all improbable that a much better price will speedily be reached for it.

Bay State gas still remains a favorite football for the brokers, and Consolidated, of Baltimore, is unaccountably weak, at 53½ to 53¾. There is no good reason for the decline, unless the same may be attributed to an offering of a block of stock long held on investment account.

Gas Stocks.

Quotations by Cochran & Close, Brokers and Dealers in Gas Stocks.

35 WALL ST., NEW YORK CITY.

NOVEMBER 29.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$35,430,000	100	184½	184¾
Central	500,000	50		..
" Scrip	220,000	..	100	.
Equitable	4,000,000	100	280	290
Bonds, 6's	1,000,000	1,000	105	.
" 1st Con. 5's	2,300,000	1,000	114	.
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	330	350
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	.
Northern	150,000	50	..	
" Bonds	150,000	1,000	..	98
New York and East River	5,000,000	100	79	81
Preferred	2,000,000	100	98	104
Bonds 1st 5's	3,500,000	1,000	112	113
" 1st Con. 5's	1,500,000	..	105	106⅜
Richmond Co., S. I.	348,650	50	50	..
" Bonds	100,000	1,000	..	
Standard	5,000,000	100	140	145
Preferred	5,000,000	100	150	160
Bonds, 1st Mortgage, 5's	1,500,000	1,000	114	115
Yonkers	299,650	50	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	119½	120½
" " Bonds (5's)	15 000,000	1,000	110½	111
Bay State	50,000,000	50	5⅛	5⅝
" Income Bonds	2,000,000	1,000	..	35
Boston United Gas Co.—				
1s Series S. F. Trust	7,000,000	1,000	93	..
2d " " "	3,000,000	1,000	80	81
Buffalo Mutual	750,000	100	125	..
" Bonds	200,000	1,000	95	100
Central, San Francisco	2,000,000	..	95	..
Chicago Gas Company	25,000,000	100	97¼	97⅝
Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Columbus	1,069,000	.	91	94
1st Mortgage	1,085,000	..	..	96
Consumers, Jersey City	2,000,000	100	75	..
" Bonds	600,000	1,000	100	..x
Cincinnati G. & C. Co.	8,500,000	100	202	203
Consumers, Toronto	1,600,000	50	184½	187
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	
Consolidated, Baltimore	1,000,000	100	53⅛	53¾
Mortgage, 6's	3,600,000	..	107	107½
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490,000	..	..	..
Detroit	4,000,000		57	60
" Con. Bonds	4,312,000	..	85	90
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Fort Wayne	2,000,000	..	81	85
" Bonds	2,000,000	..	93	95
Hartford	750,000	25	..	145
Indianapolis	2,000,000	..	118	125
" Bonds, 6's	2 650,000	..	107	109
Jersey City	750,000	20	180	..
Lafayette Gas Co., Ind.	1,000,000	100	86	88
Bonds	1,000,000	1,000	92	94
Louisville	2,570,000	50	..	..
Laclede, St. Louis	7,500,000	100	40	40½
Preferred	2,500,000	100	94	96
Bonds	9,034,400	1,000	101	102
Little Falls, N. Y.	50,000	100	..	100
Bonds	25,000	..	..	100
Montreal, Canada	2,000,000	100	200	.
Newark, N. J., Gas Co.	1,000,000	..	200	220
Bonds, 6's	4,000,000	..	128	130x
New Haven	1,000,000	25	225	..
Oakland, Cal.	2,000,000	..	53⅛	54
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	92¼	92½
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,00	1,000	..	108
2d "	2,500,000	1,000	104	105
Peoples, Jersey City	500,000	50	..	175

Rochester Gas & Elec. Co..	2,150,000	50	..	..
Preferred.....	2,150,000	50	83	..
Consolidated 5's.....	2,000,000		87½	90
San Francisco, Cal.....	10,000,000	100	94	94½
St. Paul Gas Light Co.....	1,500,000	100	49	51
1st Mortgage, 6's.....	650,000	..	84	87
Extension, 6's.....	600,000	..	..	..
General Mortgage, 5's..	2,400,000	.	88	90
Syracuse, N. Y.....	2,500,000	25	19	20
Bonds.....	1,000 000		94	97
Washington, D. C	2,000,000	20	250	
Western. Milwaukee.....	4,000,000	100	83	85
Bonds, 5's	3,556,000	.	102	103
W lmington, Del. .	550,000	50	200	202

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DIVIDEND NOTICE.

OFFICE OF WELSBACH COMMERCIAL COMPANY,
40 WALL ST., NEW YORK CITY, NOV. 11, 1897.

The Directors have this day declared a quarterly dividend of two (2) per cent. on the preferred stock, payable Dec. 10, 1897, to stockholders of record at the close of business Nov. 30, 1897. Transfer books of the preferred stock will be closed from Dec. 1 to Dec. 10, 1897, both inclusive. Checks will be mailed

1172-3 EDWARD C. LEE, Treasurer.

Wanted, to Purchase or Lease,

A Gas Works in a Town of 5,000 to 10,000 Population, Near New York.

Or would buy a controlling interest. Particulars will be treated confidentially. Address

1172-3 "G. A. S.," care this Journal.

Wanted, to Purchase or Lease,

A Gas Plant in a Town of from 8,000 to 20,000 Inhabitants.

The States of Illinois, Indiana, Ohio or Michigan preferred.

1172-4 Address "H. T.," care this Journal.

GAS ENGINEER AND CHEMIST,

age 32, is open to take charge of a coal, oil, or water gas plant. Will travel for responsible firm. Has had experience in working inclined retorts. First-class references and testimonials. Address

1172-6 "G.E.C.," care this Journal.

Position Wanted

As Superintendent of Gas Works.

Has had 19 years' experience in the manufacture and distribution of water gas, in works with a capacity of 100,000 to 5,000,000 cubic feet per day. Best of references. Address

1169-7 "W. J. B.," care this Journal.

For Sale or Exchange,

Modern Gas Plant in Growing Pennsylvania City.

Capacity of works, 75,000 cubic feet per day; 11 miles of mains. Splendid bargain for the right party. Address

1171-4 "T. G. C.," care this Journal.

For Sale.

A Small Gas and Electric Light Plant,

in a Southern city of 3,800 inhabitants.

Address FORT WAYNE ELECTRIC CORPORATION,

1097-tf Fort Wayne, Ind

FOR SALE.

Hydraulic, Dip, Branch and Ascension Pipes, Mouthpieces and Lids, for four Benches of 5's and for one Bench of 3 retorts.

Two Coolers, or Air Condensers, each of 150 000 cubic feet capacity.

Multitubular Condenser, shell, 36 in. diameter, with 98 2-in. tube, 10 ft. 6 in. long.

D-Shaped Tar Extractor, 8 ft. long, 1 ft. 6 in. deep.

Scrubber, 48 in. diameter, 11 ft. 9 in. high. Three man holes, 11 in. by 15 in.

8-inch Center Seal. Four Purifiers, 8 ft. x 6 ft.

KEY CITY GAS CO

1119-tf Dubuque, Iowa.

IRON MASS

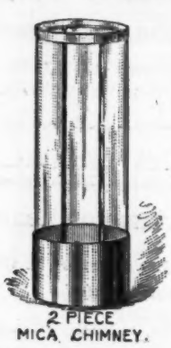
For Gas Purification.

Acts immediately, and more efficiently than any other purifying agent now in use.

GREENPOINT CHEMICAL WORKS,

Greenpoint Ave. and Newtown Creek, Brooklyn, N. Y.

Our Mica Chimneys



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Etched Chimneys to Order.

For Welsbach Lights

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THEO. CLOUGH,

(Established 1870.)

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Maxim & Clough Adjustable Gas Burners

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THEO. CLOUGH, - - Dobbs Ferry, N. Y.

Utilize Your Gas Liquor.

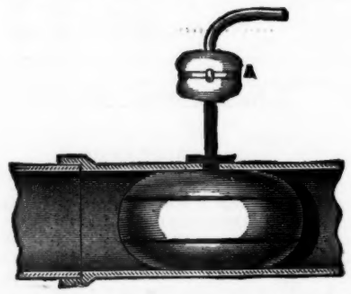
NO EXTRA LABOR OR OPERATING EXPENSES.

Ammonia Concentrator,

Not Expensive. Write to

STROH & OSIUS, Pat'ees, or Mich. Ammonia Works, Detroit, Mich.

Peerless Patent Improved Gas Bag



These Gas Bags are used to stop the flow of gas while repairing or making alterations in gas mains. There have been numerous cases of workmen being badly injured, and some times fatally, by the escape of gas resulting from the bursting of a bag, and our patent improvement is designed to obviate such calamities. The indicator *A* shows unerringly when the bag has been sufficiently inflated to pack the main, and when the pumping should be stopped. Our Bags are made of a rubber stock especially prepared to admit of great distension, and to resist the action of Oils, Gases, Naphtha and other residuum in the mains, and they are made with lapped joints, which adds greatly to their strength.

3-in. Gas Bag, each,	$0.60		12-in. Gas Bag, each,		$5.00
4 " " "	.80		16 " " "		8.25
5 " " "	1.05		20 " " "		12.00
6 " " "	1.75		24 " " "		17.00
8 " " "	2.65		30 " " "		27.50
10 " " "	3.75				

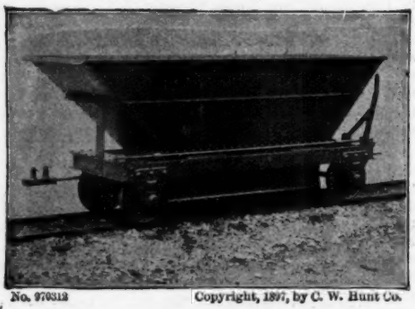
The Peerless Rubber Mfg. Co.

16 Warren St., N. Y. City.

"INDUSTRIAL" RAILWAYS,

Charging Cars,

Coke Cars, Tip Cars,



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For bringing coal from storage bins to retort houses; for handling hot coke directly from the retorts; and for carrying ashes, respectively.

These railways are especially designed for handling material in and around gas works.

We have just issued a new, 40-page, illustrated Catalogue, No. 9703, giving detailed information in regard to this system of tracks and cars. Before you forget it, send for a copy.

C. W. HUNT COMPANY,

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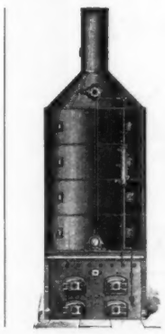

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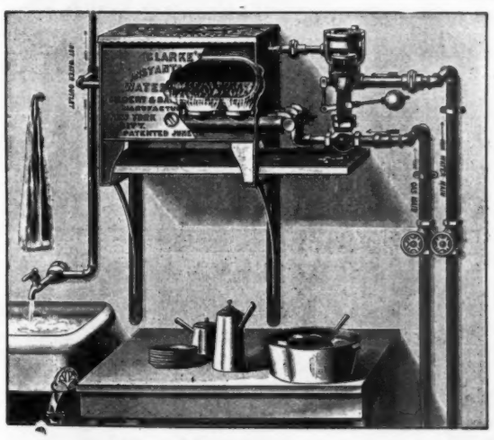

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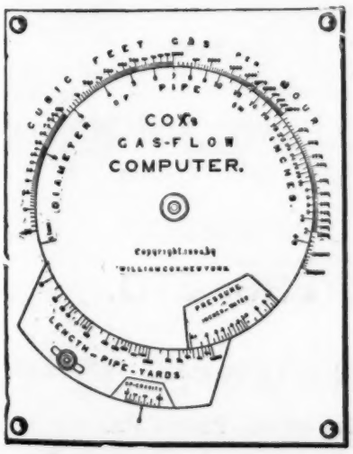

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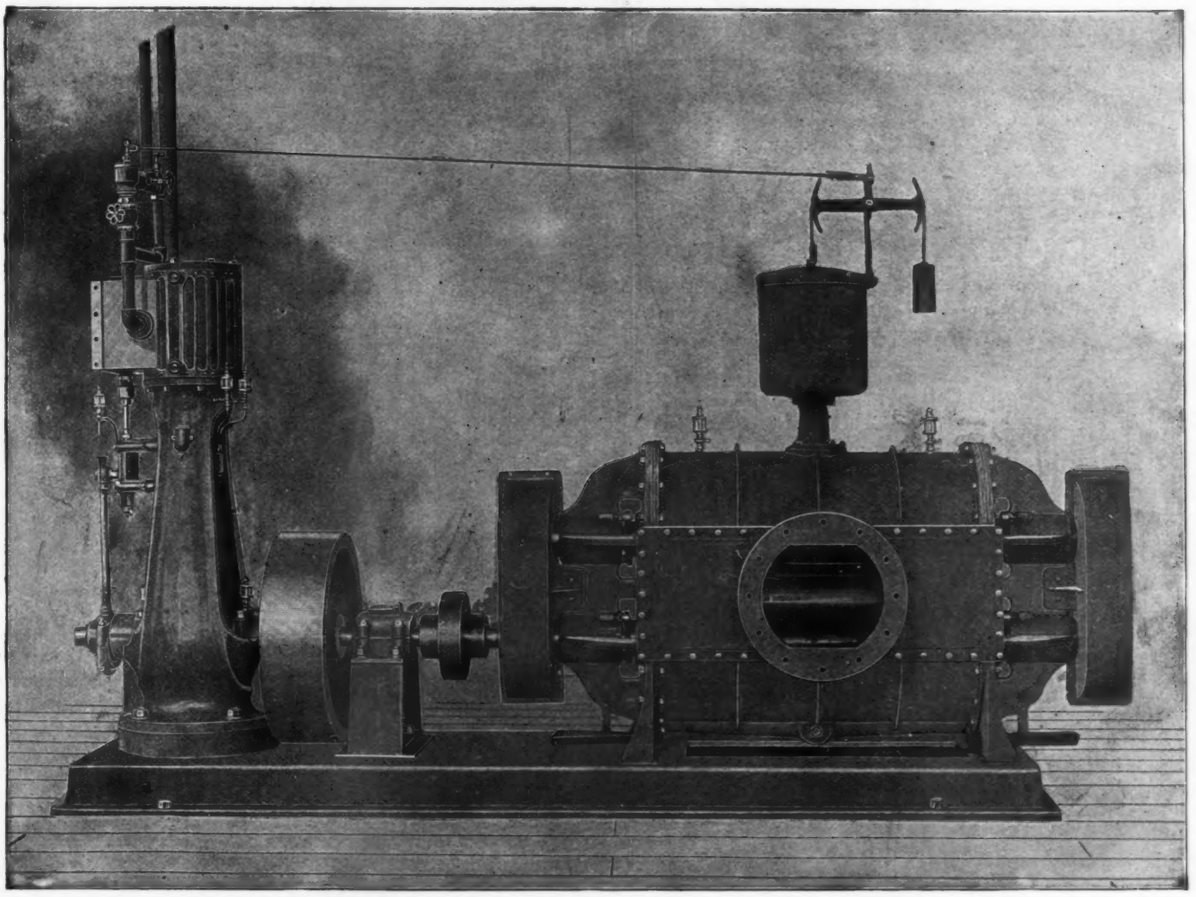

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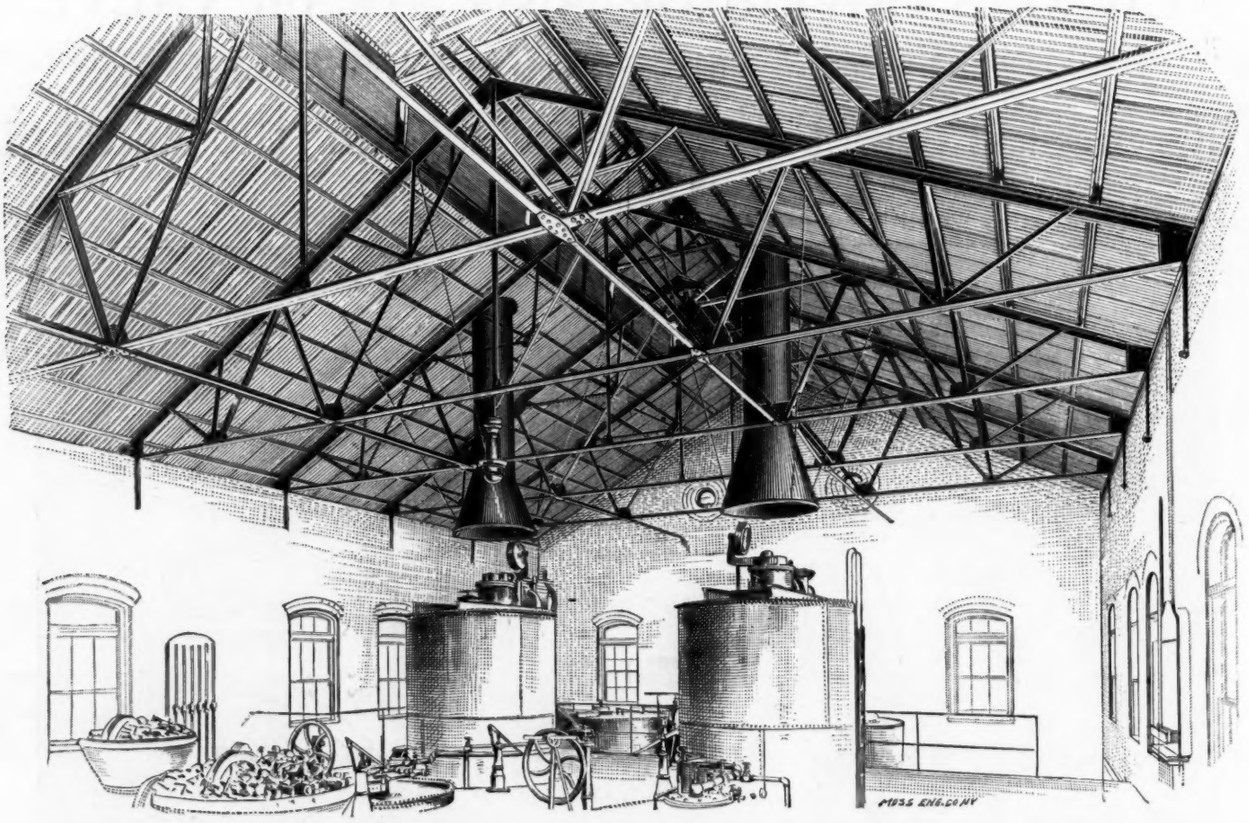

The above illustration is taken direct from a photograph, and shows the construction of an Iron Truss Roof designed and built by us for the Providence Gas Light Company, at Providence, R. I. The building is 40 ft. in width by 100 ft. in length, the side walls being of brick and the roof being entirely of iron—that is, iron trusses and iron purlins covered with corrugated iron. The building is ventilated by our Improved Ventilators, extending the full length of the roof, with side shutters opened and closed by cords from the floor. No woodwork is used in any way about the construction of the building.

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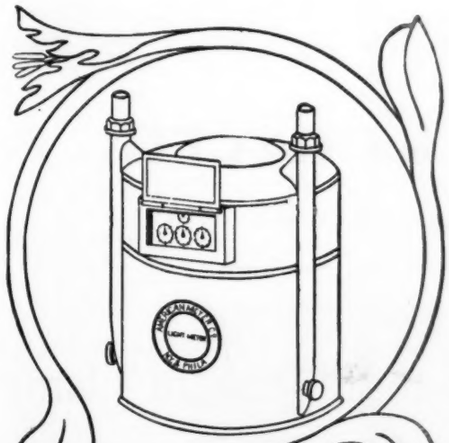

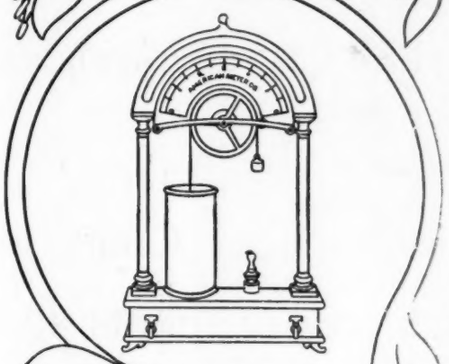

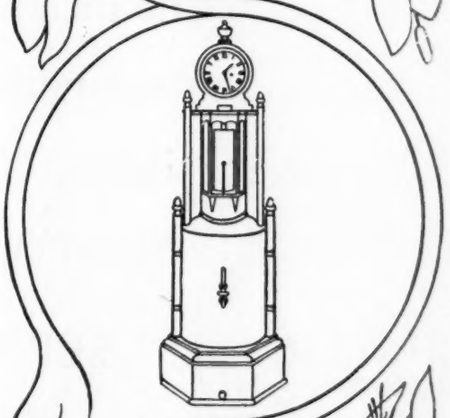

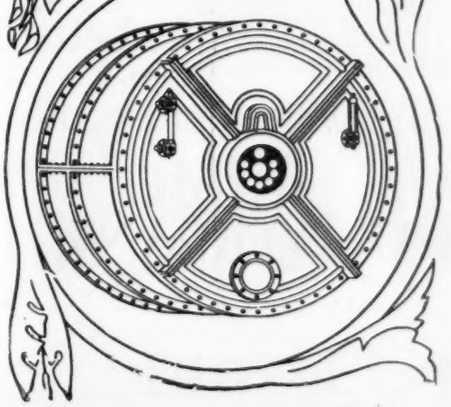

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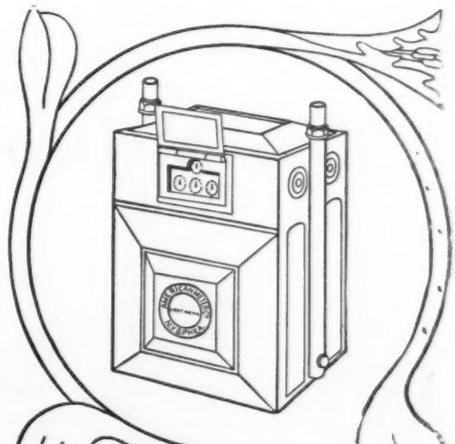
PUBLIC LIGHTING TABLE.

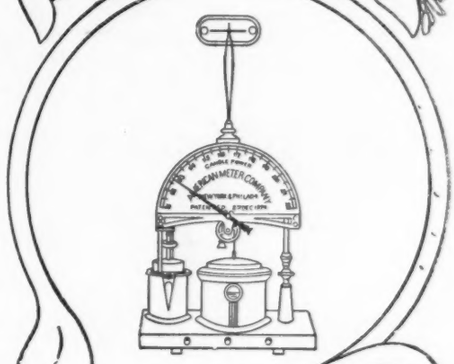
DECEMBER, 1897.

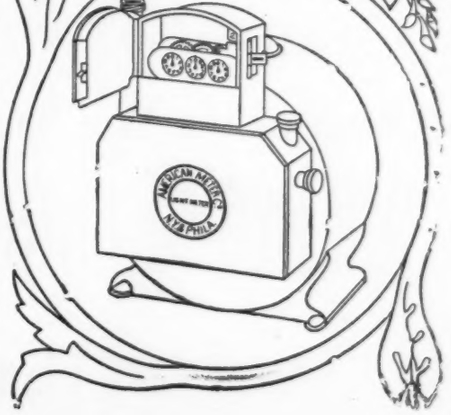
Day of Week.	Table No. 1. Following the Moon. Date.	Light.	Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Extinguish.
				P.M.	A.M.
Wed.	1	11.50 PM	6.00 AM	4.20	6.10
Thu.	2	12.50 AM	6.00	4.20	6.10
Fri.	3	1.50	6.00	4.20	6.15
Sat.	4	2.50	6.00	4.20	6.15
Sun.	5	3.50	6.10	4.20	6.15
Mon.	6	4.50	6.10	4.20	6.15
Tue.	7	No L.	No L.	4.20	6.15
Wed.	8	No L. FM	No L.	4.20	6.15
Thu.	9	No L.	No L.	4.20	6.15
Fri.	10	5.00 PM	6.40 PM	4.20	6.20
Sat.	11	5.00	7.40	4.20	6.20
Sun.	12	5.10	8.50	4.20	6.20
Mon.	13	5.10	9.50	4.20	6.20
Tue.	14	5.10	10.50	4.20	6.20
Wed.	15	5.10	12.00 AM	4.20	6.20
Thu.	16	5.10 LQ	1.00	4.20	6.20
Fri.	17	5.10	2.10	4.20	6.20
Sat.	18	5.10	3.20	4.20	6.20
Sun.	19	5.10	4.40	4.20	6.20
Mon.	20	5.10	6.20	4.20	6.20
Tue.	21	5.10	6.20	4.20	6.20
Wed.	22	5.10	6.20	4.20	6.20
Thu.	23	5.10 NM	6.20	4.20	6.20
Fri.	24	5.10	6.20	4.20	6.25
Sat.	25	5.10	6.20	4.20	6.25
Sun.	26	5.10	6.20	4.20	6.25
Mon.	27	5.10	6.20	4.20	6.25
Tue.	28	9.30	6.20	4.20	6.25
Wed.	29	10.40	6.20	4.20	6.25
Thu.	30	11.40 FQ	6.20	4.20	6.25
Fri.	31	12.40 AM	6.20	4.20	6.25

TOTAL HOURS LIGHTING DURING 1897.

By Table No. 1.	Hrs. Min.	By Table No. 2.	Hrs. Min.
January	233.00	January	423.20
February	187.20	February	355.25
March	202.00	March	355.35
April	170.40	April	298.50
May	163.00	May	264.50
June	140.40	June	234.25
July	151.40	July	243.45
August	167.30	August	280.25
September	174.40	September	321.15
October	200.00	October	374.30
November	205.20	November	401.40
December	220.10	December	433.45
Total, yr.	2216.00	Total, yr.	3987.45







To Whom It May Concern.

WE have learned that the makers of the "Sunlight" lamp assert that there has been a decision in the English Courts which saves them and their customers from liability as infringers of the Welsbach patents.

We assure the public there is no decision of any Court, in England or elsewhere, that directly or indirectly warrants the statement or inference that the lamp sold by the Sunlight Incandescent Gas Lamp Company of America is not an infringement of the Welsbach Light as made under the American patents, of which the Welsbach Light Company is sole and exclusive owner.

NOTICE is hereby given to all PURCHASERS and USERS of the so-called "Sunlight" lamp that suits will be brought against them for DAMAGES for INFRINGEMENT of the Letters Patent of the Welsbach Light Company, and will be prosecuted vigorously.

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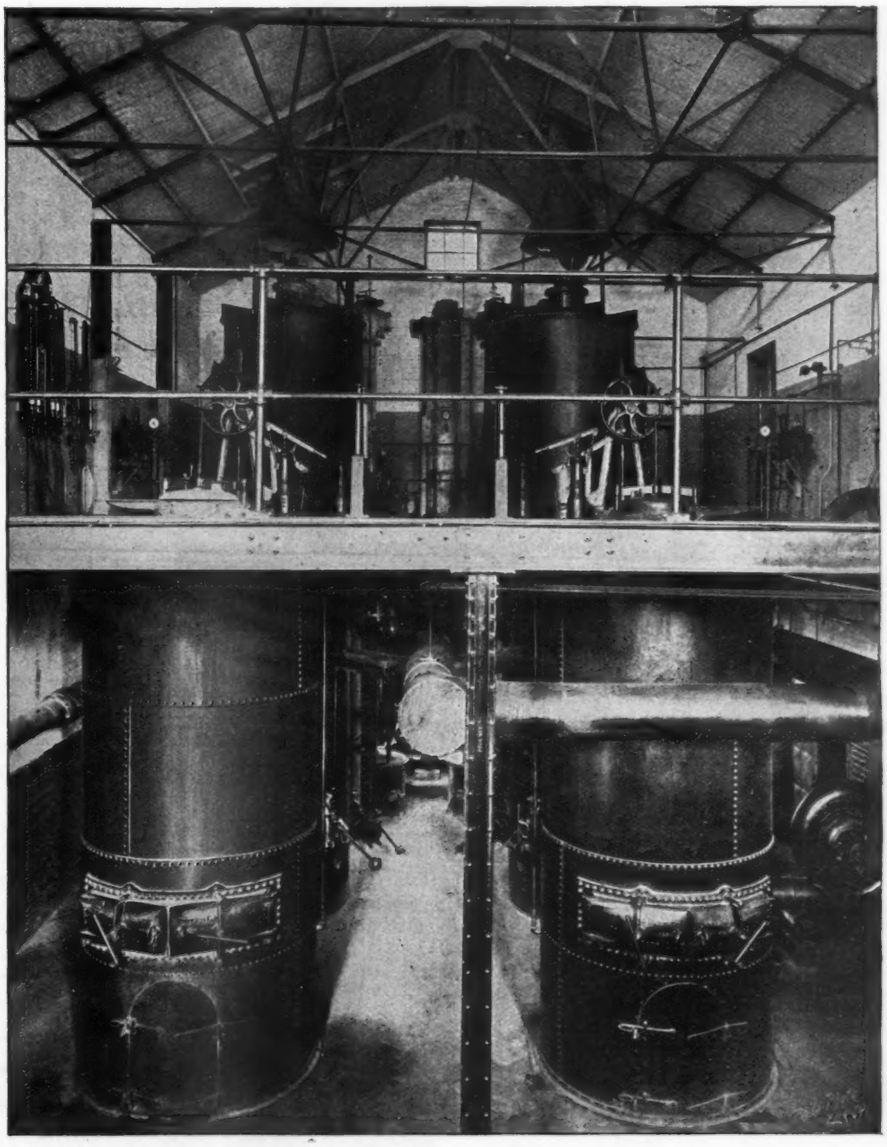
Number of Installations to Date, - - 238

Total Daily Capacity, 127,700,000 Cu. Ft.



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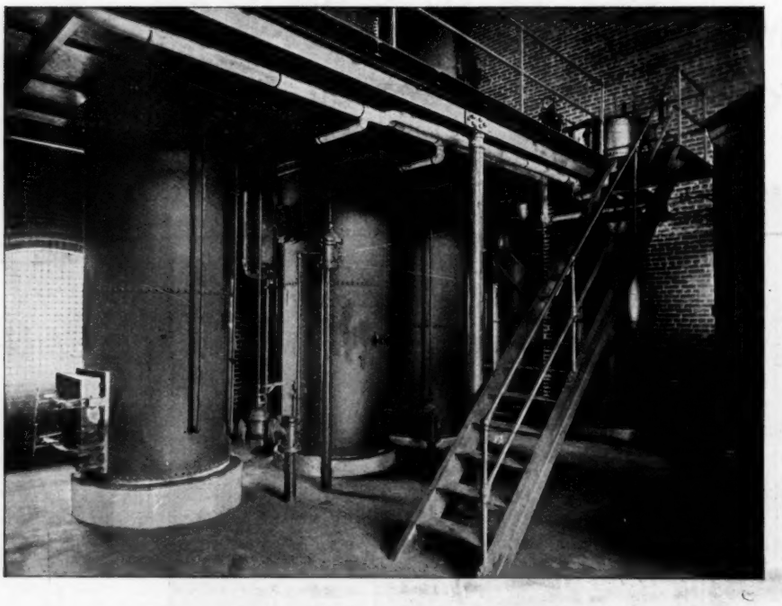

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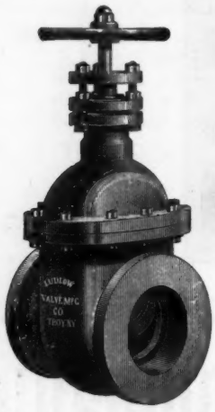

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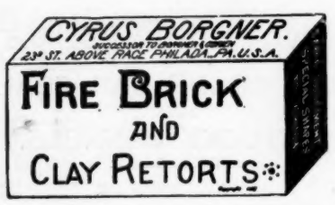

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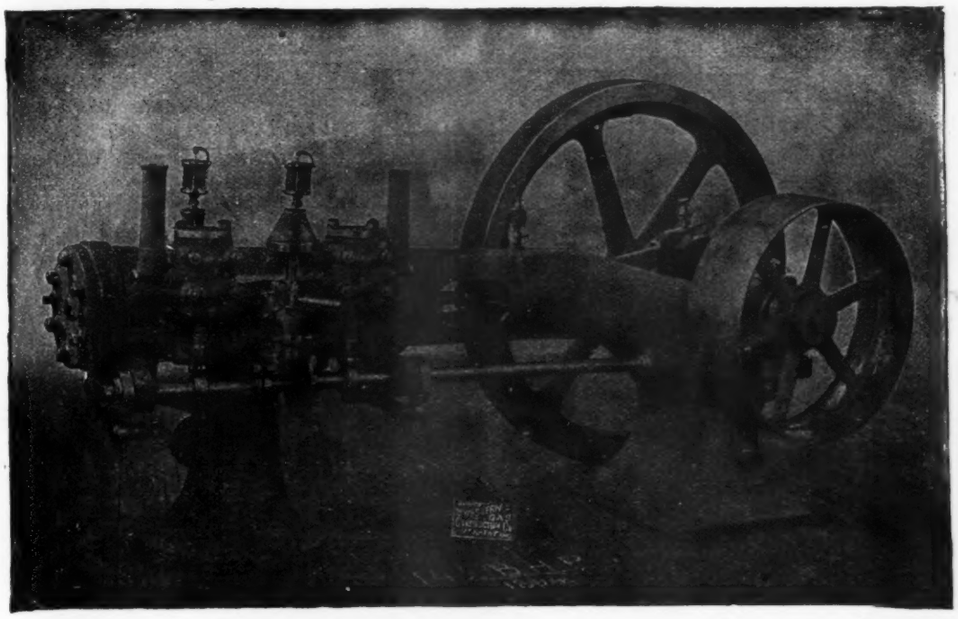

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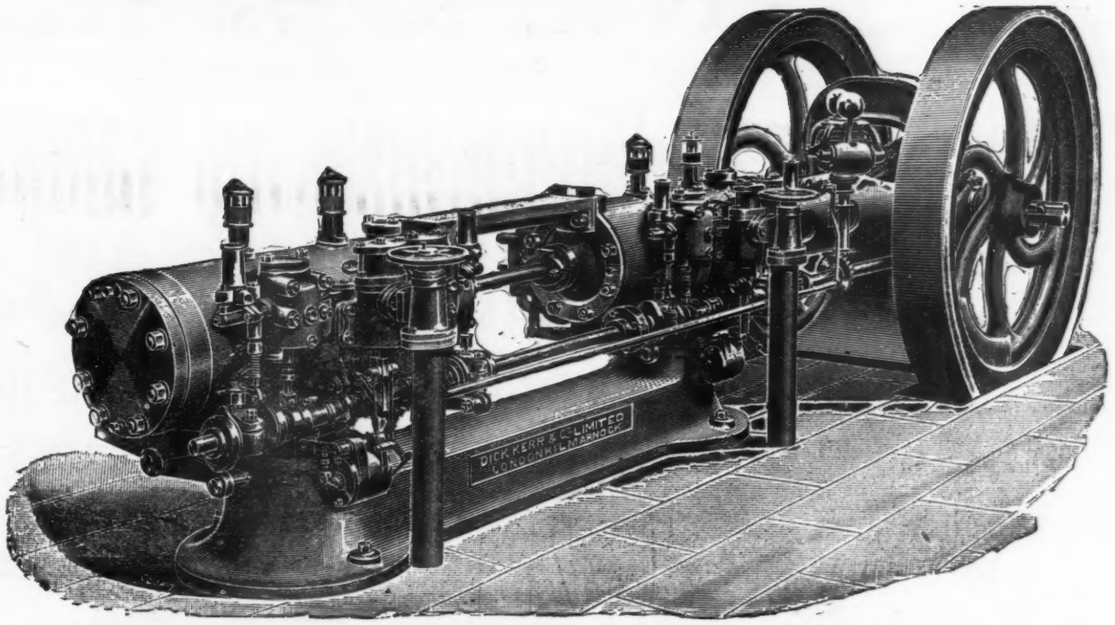

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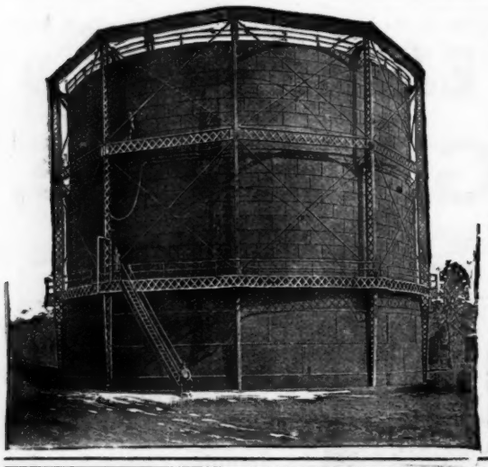

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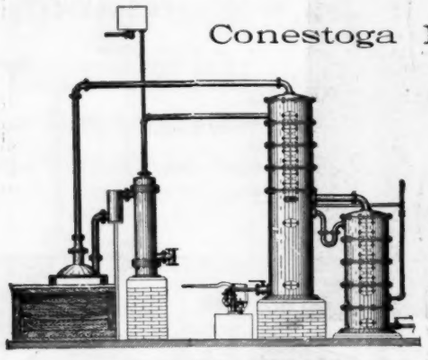

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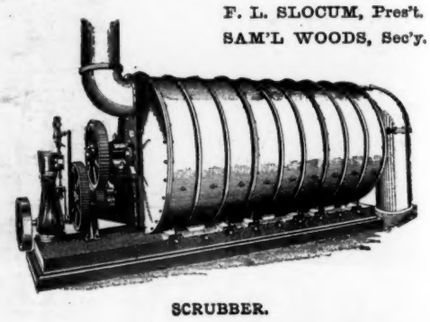

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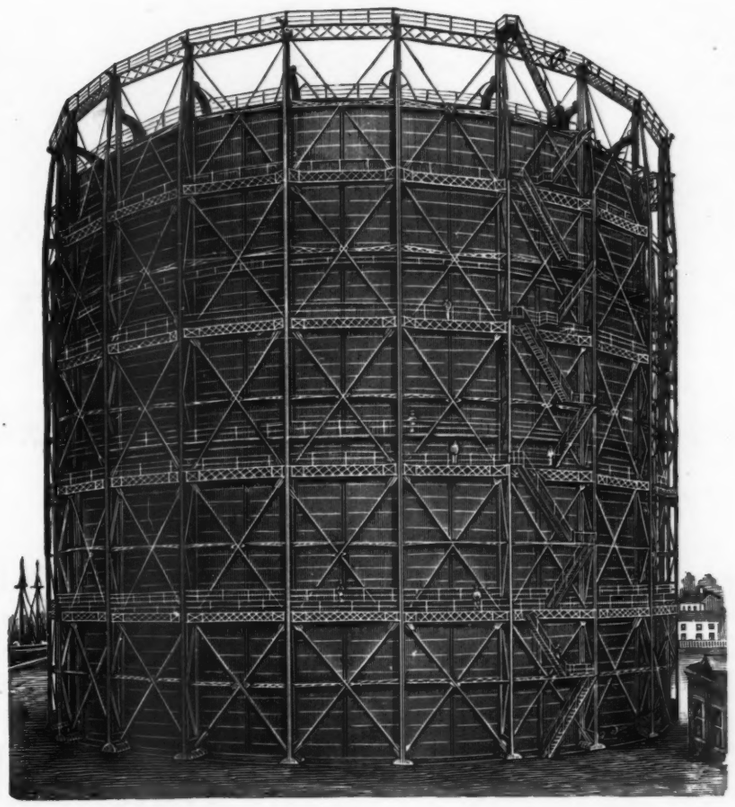

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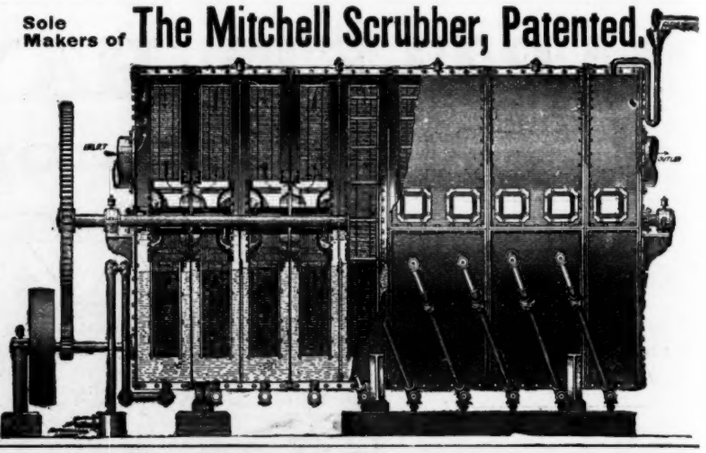

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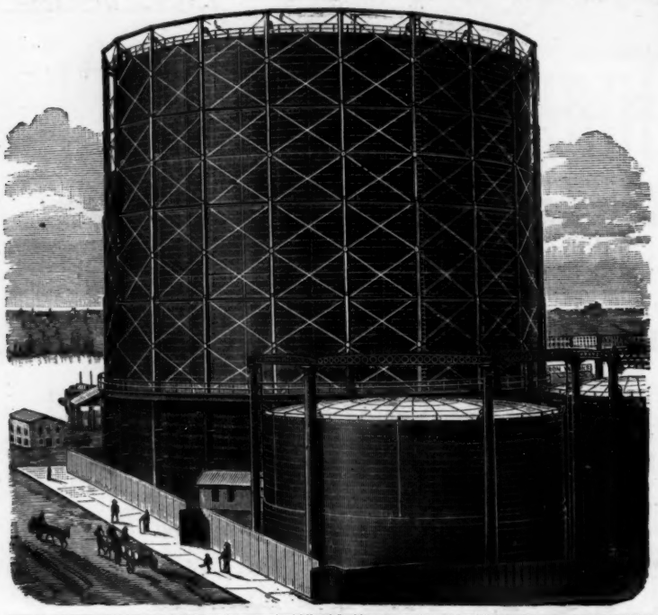

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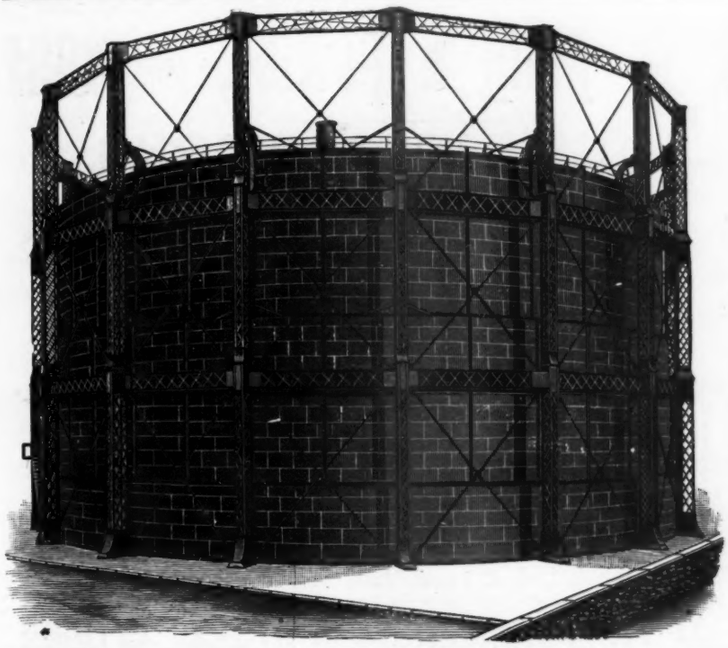

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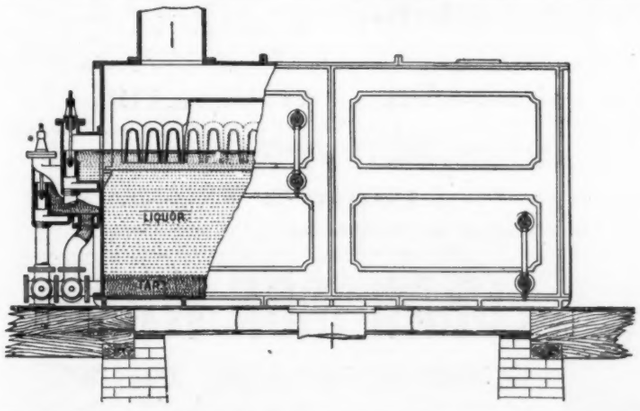

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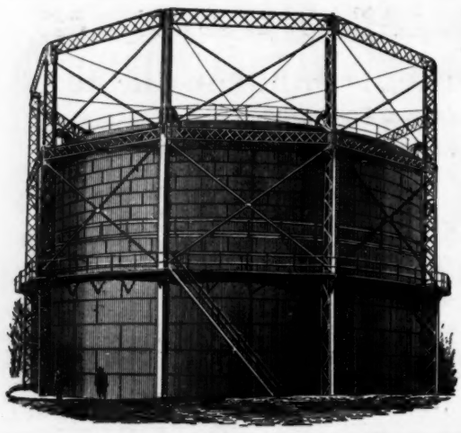

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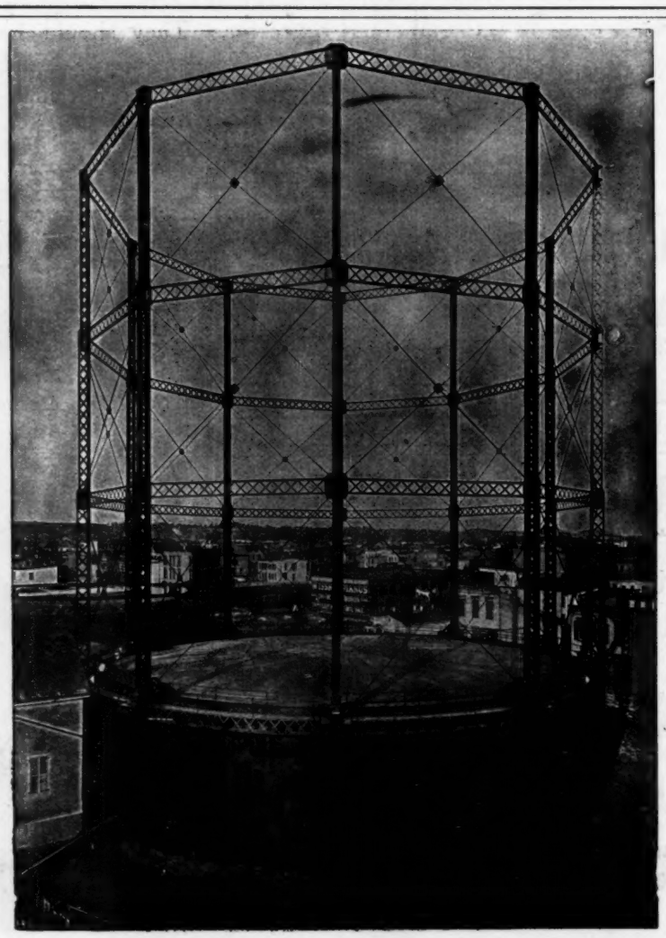

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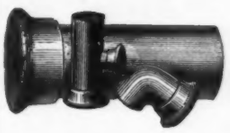

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